



PRINCIPAL CONTENTS

Crop and Fallow Competitions
(Rupanyup, Dimboola, Beulah)

Flue-Curing Tobacco

Feeding Dairy Cows

Weeds and Their Eradication

World's Poultry Congress

Cultivation of Hops

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OF

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VICTORIA, AUSTRALIA.

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The Journal is issued monthly. The subscription, which is payable in advance and includes postage, is 3s. per annum for the Commonwealth and New Zealand, and 5s. for the United Kingdom and Foreign Countries. Single copy, Threepence.

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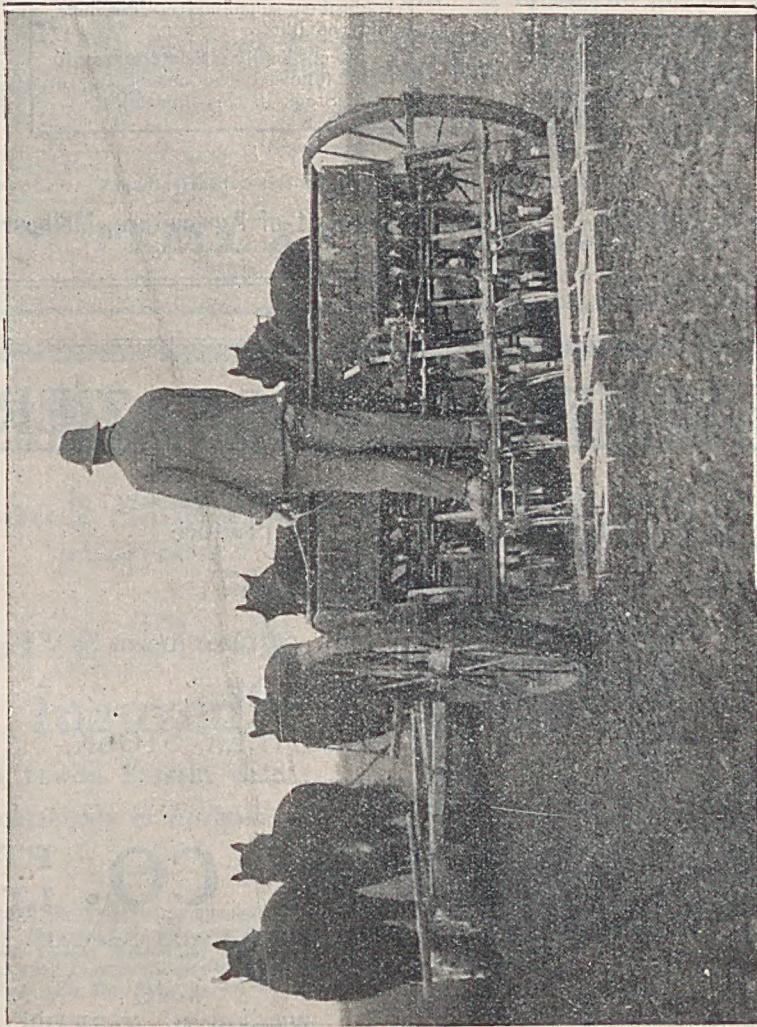
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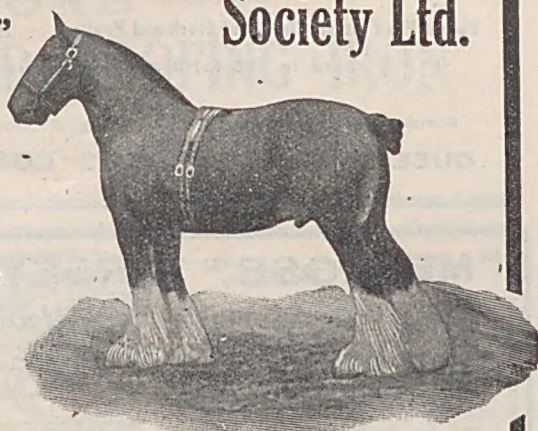
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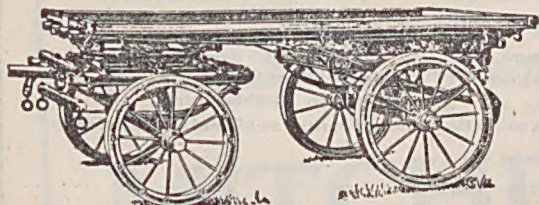
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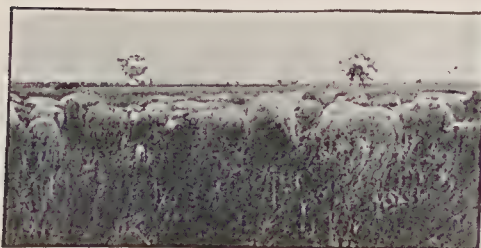
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THE JOURNAL
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Vol. XX.

April, 1922.

Part 4.

CROP AND FALLOW COMPETITION,
RUPANYUP, 1921.

Report of the Judge, H. A. Mullett, B. Ag. Sc., Chief Field Officer.

The Crop and Fallow Competition organized by the Rupanyup Agricultural Society continues to rank as one of the most important held in the Wimmera. This year fifty-two entries were received in the three sections open for competition. In all twenty-five farms were visited. The area of wheat actually inspected totalled 5,460 acres—a record for any district. It averaged 210 acres per farm. The area of fallow judged was 1,100 acres.

The yield of each crop was carefully estimated, and a thorough examination made for disease and other peculiarities. Each competitor supplied full particulars of his method of growing the crop. By a comparison of the apparent yields and methods it has been possible to make deductions which throw some light on the best methods of growing wheat.

A feature of the competition is the Brunton Cup—a handsome silver trophy donated by Messrs. Brunton and Company, Flour Millers, for the best wheat crop raised on one farm over a period of three years. The whole of the wheat on the farm must be entered. This provision accounts for the comparatively large areas of wheat submitted for inspection on each competing farm at Rupanyup. It insures the crop being produced under conditions which are normal for the whole farm.

The season was a bumper one, and after making a critical inspection of the whole of the Wimmera, one is safe in asserting that, on the average, heavier crops were grown in no other district. Yields of 40 bushels to the acre were common enough, and a few were close on 50 bushels. If anything the crops were too rank, especially where sown in June. Some loss must have occurred in the "down" patches especially, as cut-worms found suitable cover as well as green straw there late in the season.

The soil at Rupanyup, in common with most of that on the southern boundary of the black land in the Wimmera, is exceedingly fertile. There are two main grades—heavy blue, grey, friable clay loams on the southern margin and brownish black loams further inland. There are red soils at Marnoo, and of course the usual red patches throughout the district as well.

The heaviest crops appeared to be those on the brownish black soils. On the whole these soils grow quite as good crops as the heavier type, and they are somewhat easier to cultivate.

In this district, as at Horsham, Murtoa, Minyip, and Dimboola, it is found that the land can be cropped heavily to cereal crops without a spell in grass, provided of course a bare fallow is interposed before



Comfortable Homestead—Mr. McLennan's, Marnoo.

the wheat. Under this system the land becomes easier to cultivate, is freed from weeds and, far from yields declining, they appear for the present to increase, save, of course, when an occasional oat crop is omitted from the rotation; then takeall and black rust often make their presence severely felt. There is, therefore, little land resting in grass to be seen at Rupanyup. Indeed, many farms are without sheep, except a few for household purposes. Thus at harvest time the extent of the area sown to wheat in the district is an impressive sight to the visitor. The effect is heightened by farmers occasionally sowing contiguous paddocks of wheat which may stretch several miles without a break. In all these fields the level character of the standing crops and the densely packed heads of wheat were indicative of heavy yields.

There is no question that on this class of soil the profit is in cultivation—not in stock raising—and that the profit has not been inconsiderable is evidenced by the comfortable homesteads seen everywhere. But while it is difficult to argue in face of the gradually increasing

yields secured under the present system of farming, yet the fact that slowly but inevitably the humus content of the soil is being reduced must not be lost sight of. It may take generations before the effect is felt, but it will come some day. In the meantime those who wish to preserve the fertility of their land undiminished would do well not to neglect the sheep. Where oats is sown specially for their grazing, it will be found that the system pays quite as well.

Lessons from the Competition.

In assessing the yields of the magnificent crops at Rupanyup, and in questioning farmers on their methods, it gradually becomes evident that very definite reasons exist for the heavy crops, and causes equally definite for any light ones. As a rule the notably heavy crops raised there this year possess certain features in common. Most of them were grown on summer-fallowed land, which had been specially thoroughly cultivated, and which had been liberally seeded and manured.



Residence of Mr. C. Carra, Rupanyup, surrounded by young orchard.

That, of course, is always the story everywhere in the Wimmera, only this instance at Rupanyup illustrates it perhaps rather more clearly than usual.

If the data obtained in the field is examined statistically and the six crops yielding heaviest are compared with a similar number yielding poorest, it is found that four of the best are on summer-fallowed land, and five of the worst are on winter fallow. Again, the six best crops were cultivated on an average of 9.6 times, whilst the six worst were cultivated only six times.

With the six best crops an average of 82 lbs. of seed and 122 lbs. per acre of superphosphate was used; while with the six worst 69 lbs. of seed only was used, with 98 lbs. of manure per acre. The figures for the latter, too, are inflated by the fact that in several instances an attempt was made to bolster up poor cultivation by extra supplies of seed and manure.

If there is another thing that stands out, it is the comparative excellence of most of the seed wheat grown. Compared with that exhibited several years ago, there is a marked improvement. Last

season the society arranged for the purchase in bulk of some 360 bags of graded seed wheat from the Longerenong College. The wheat was purchased in one lot and railed by the truck load.

Results.

SECTION 2.—FOR BEST 60 ACRES OF WHEAT.

Twenty entries were inspected in this section. In most cases they comprised the best portions of the crop submitted in the Brunton Cup. Naturally in a season like the present, and in a district so well favoured in soils, they were exceedingly heavy. The yields in some cases must surely constitute a record.

The entry of Mr. A. Dunlop, Lallat, was placed first with 99 points. The variety was Federation—as was that of practically every other competitor. In all 190 acres of wheat were seen on this farm, and it was difficult to pick out one 60 acres as better than another. The crop was exceptionally true to type, free from weeds and from any



Residence of Mr. W. H. Kendell, Rupanyup.

disease. The wheat presented a level table-top appearance, and the heads were well filled. The generally attractive appearance of this crop was enhanced by straight work with the binder in opening the tracks.

The fallow on which the crop was grown was treated as follows:—It was summer-fallowed with a scarifier, and then in the winter ploughed with a skim plough. In the spring two strokes with the scarifier were given. After harvest the paddock was harrowed, and then towards the end of June it was re-scarified, drilled, and harrowed. Seventy pounds of seed per acre were used, with 90 lbs. superphosphate.

The excellent result secured is undoubtedly due to nice judgment displayed in the treatment of the fallow, and in seeding the crop when the conditions were at their best. The soil was of the brown, black, friable loam type.

Sixty acres of Federation shown by Mr. R. J. Jackson, Burrero, were awarded second place. In all respects this was equal to the first crop, except that the yield appeared somewhat lighter. The seed was pure, the crop clean underfoot, and disease was absent. A special

feature was absence of excess straw. Fine straw and smallish heads, pendular when ripe, appear to be characteristic of this particular strain of Federation. It was quite free from foreign heads.

This crop was also grown on summer-fallowed land which, it may be stated, was of a rather lighter type than that of Mr. Dunlop. In March the paddock was spring-toothed and then harrowed twice. In July it was scarified and harrowed twice. In October another scarifying was given, followed by the harrows. After harvest time a further stroke of the harrows was given, and the final scarifying took place in May. Then there was a double harrowing before the drill, which was followed by the harrows. The paddock was drilled late in June, 80 lbs. of seed with 102 lbs. superphosphate being used.

It will be noticed that thirteen strokes of the cultivating implements of one sort or another were given this field.



Well-preserved Fodder Reserves—Mr. C. Carra's.
(Note mouse-proof enclosures.)

Mr. Jackson is following his present system with great success. His crop last year averaged some 43 bushels per acre for 265 acres.

The crops of Messrs. W. Newall and D. N. McLennan were bracketed equal with 96 points. They were both heavier than the last crop, but lost a few points on the score of trueness to type, though in this respect they were far about the average. Both these crops were rather too tall for safety and ease in harvesting.

Mr. Newall's crop was grown on a fine black paddock, thoroughly summer-fallowed and liberally seeded and manured. In all no less than seven separate scarifyings and seven harrowings were given. Seventy-five pounds of Federation wheat was sown per acre at the end of July, with 186 lbs. of superphosphate.

Mr. McLennan's crop was grown on winter-fallowed land, well-worked and liberally seeded and manured. The land was ploughed in July, harrowed in August, and scarified at the end of August. Two

light strokes of the scarifier were given in September and October, the last followed by harrows. In March the paddock began to drift with the wind, and was harrowed to check this. In May and June it was worked up twice with the scarifier to kill weeds, and sown in July with 95 lbs. of seed per acre and 112 lbs. superphosphate.

The crop shown by Mr. C. Carra was also heavy, but lost points because it was "down" badly in patches. Full points were scored for the type of seed grown; it was quite free of strangers. The land was well-worked summer fallow. It was sown early in July, 80 lbs. of seed being used per acre with 120-130 lbs. of superphosphate.

Other good crops were shown by Messrs. R. Miller, W. Hemphill, G. Hemphill, D. Payne, Geo. Kennedy, and Bell Brothers.

DETAILS—SECTION 2—BEST 60 ACRES OF WHEAT.

Name.	Yield.	Trueness to type.	Disease.	Weeds.	Evenness.	Total.
Possible Points	35	20	15	15	15	100
A. Dunlop	35	19	15	15	15	99
R. J. Jackson	33	20	15	15	15	98
W. Newall	33	18	15	15	15	96
D. McLennan	35	18	15	14	14	96
C. Carra	34	20	15	14	12	95
W. J. Hemphill	30	19	15	15	15	94
G. Hemphill	29	19	15	15	15	93
D. Payne	30	19	14	13	14	90
Geo. Kennedy	31	18	15	12	14	90
Bell Bros.	29	18	15	14	13	89
G. Miller	29	19	13	12	14	87
H. Holcamp	25	19	14	13	14	85
C. Culton	27	16	15	12	15	85
J. J. Crampton	31	16	10	13	14	84
J. Sweetman	29	17	10	13	15	84
J. Chapman	24	19	15	12	14	84
W. H. Kendall	22	14	14	11	14	75
R. Duncan	20	18	12	10	14	74
R. Hurley	25	15	7	13	11	71

NOTE.—The points given for yield do not represent bushels per acre. The highest yields were well over 45 bushels per acre. The differences between the points, as near as it is possible to estimate, represent bushels per acre.

Section I.—Brunton Cup.

FOR BEST WHEAT CROP GROWN ON ONE FARM OVER A PERIOD OF THREE YEARS. THE WHOLE OF THE WHEAT TO BE SHOWN.

This is the second year of the competition; twenty-three farms are taking part. Mr. R. J. Jackson so far has gained the highest aggregate for the two years (185). Mr. A. Dunlop is second with 179, and Mr. W. J. Hemphill third with 178 points. The competition next year should be keen.

Mr. A. Dunlop secured the highest award this year. The description already given of his crop in the 60-acre section applies to the whole 190 acres. Ninety-eight points out of 100 were scored. Mr. R. Jackson was second with 88 points, Mr. W. J. Hemphill and Messrs. Carra Brothers were bracketed equal with 87 points each, as were Messrs. C. Carra and Geo. Kennedy with 86 points each. Mr. R. Jackson

showed 300 acres of Federation wheat, yet despite the large area the crop was wonderfully even and prolific throughout. The treatment of the 150 acres, summer fallowed, has already been described. The balance, winter fallow, was treated thus:—Skim-ploughed in August, harrowed twice; scarified in spring and harrowed. After harvest the paddock was harrowed and then scarified twice in front of the drill, drilled and harrowed. This paddock was sown last; it was finished on 15th July. One and a half bushels of Federation were used per acre, with 115 lbs. of manure. The manure was thus increased as the season advanced. A head or two of smut was noticed, and points deducted accordingly.

Mr. W. J. Hemphill's crop at Burrero consisted of 215 acres of summer fallow. Between nine and ten separate cultivations were given. The seed, Federation, was sown at the end of June at the rate of 80 lbs. per acre, with 112 lbs. superphosphate.

Messrs. Carra Brothers' crop of 100 acres of Federation was all sown on well-worked winter fallow. Seeding took place in mid-June. Eighty pounds of seed and 120 to 130 lbs. of superphosphate per acre were applied. The combined drill was used. This crop was very free from foreign heads and in every way creditable.

DETAILS.—SECTION I.—BRUNTON CUP.

For best wheat crop grown on one farm over a period of three years.
The whole crop to be shown.

Name.	Area shown.	Yield.	Type.	Disease.	Weeds.	Evenness.	Total, 1921.	Handicap.	Total, 1920.	Grand Total.
Possible Points ..	..	35.	20	15	15	15	100	..	100	250
Acres.										
A. Dunlop ..	190	34	19	15	15	15	98	..	81	179
R. J. Jackson ..	300	28	20	10	15	15	88	..	97	185
W. J. Hemphill ..	215	25	18	15	14	15	87	..	91	178
Carra Bros. ..	100	29	19	14	12	13	87	..	86	173
Bell Bros. ..	395	26	18	15	12	13	84	..	86	170
C. Carra ..	250	28	20	15	11	12	86	..	82	168
Geo. Kennedy ..	200	28	18	15	12	13	86	..	70	156
G. Hemphill ..	104	22	19	15	13	14	83	..	90	173
Miller Bros. ..	122	25	19	15	11	13	83	..	71	154
H. Holkamp ..	300	22	19	13	14	10	78	3	82	163
A. McKinnon ..	28	28	19	11	11	12	81	..	81	162
J. Chapman ..	137	21	19	15	12	13	80	..	79	159
J. J. Crampton ..	435	27	17	10	11	14	79	..	81	160
G. Ellard ..	265	27	19	10	11	12	79	..	81	160
C. Culton ..	200	27	16	10	11	14	78	..	74	152
W. H. Kendell ..	100	21	16	14	12	11	74	3	77	154
D. Payne ..	255	27	16	8	12	13	76	..	76	152
J. Sweetman ..	303	24	16	9	12	13	74	..	62	136
Geo. Chapman ..	285	20	17	13	10	13	73	..	87	160
C. A. Graham ..	270	24	14	10	12	12	72	..	75	147
R. Hurley ..	280	25	15	7	13	11	71	..	81	152
R. Duncan ..	220	18	18	13	8	13	70	..	75	145
A. Schafer ..	..	20	17	13	5	13	68	..	57	125

NOTE.—See note under Section 2.

Section III.—Best Fallowed Land.**FIFTY PER CENT. OF FALLOW TO BE JUDGED.**

Ten entries were inspected, all on black soil; nine had been summer-fallowed, and one was winter fallow. The first prize was awarded to the winter fallow of Mr. W. Newall. This paddock of 115 acres



Heavy Crop of Federation—Mr. R. J. Jackson's, Burrero, Rupanyup.



Mr. Newall's Fine Paddock of Federation Wheat at Marnoo.

appeared in perfect condition. The moisture conserved was high, the mulch deep and mellow, weeds were absent, and the cultivation had been thorough. Mr. Newall firmly believes in plenty of cultivation,

not only with the object of killing weeds, but also to till the soil so as to release plant food and to store moisture. He ploughs to $3\frac{1}{2}$ inches deep, and subsequently when scarifying is not afraid to tear into the soil.

The paddock in question was ploughed with a set plough in winter, followed by the harrows. Later on the fallow was scarified three times, each time with the harrows following shortly afterwards. The result was a perfect piece of work. Ninety-nine points were awarded.

Mr. C. Carra was second with 97 points. One hundred and fifty acres of summer fallow was shown, consisting of a rich drained swamp with a few red patches on rising ground. The moisture content was good. The mulch was about 3 inches deep and of mellow texture. This paddock was ploughed in March, and then scarified in July, October, and early in November. Mr. Carra rarely uses harrows, as his land when worked down fine tends to blow.



Harvesting Oats with Reaper Thresher—Mr. D. Payne's, Rupanyup.

Mr. R. J. Jackson and C. H. Graham were placed equal with 96 points. Mr. Jackson's fallow is interesting in that 100 acres of it were prepared without the aid of a plough, after the manner practised in the Warraeknabeal district. Unlike Mr. Carra, Mr. Jackson relies largely on the harrows to maintain tilth and conserve moisture. The paddock was scarified three times and harrowed five times. It may be remarked that this land is rather shallower and somewhat lighter in texture than that of Mr. Carra. There is no doubt that Mr. Jackson's practice suits his particular type of soil.

A number of the fallows were faulted because the bottom of the seed bed showed ridging, due either to careless driving or to the use of scarifiers with some of the points very blunt.

Fifty acres of the fallow shown by Mr. W. H. Kendell were ploughed with a set plough drawn by an oil tractor. The spring-toothed portion of a combined drill was used to work over the land with good effect

DETAILS.—SECTION III.—FOR BEST FALLOWED LAND. FIFTY PER CENT. OF FALLOW TO BE JUDGED.

Name.	Moisture.	Mulch.	Weeds.	Cultivation.	Total.
Possible points	25	25	25	25	100
W. Newall	25	25	25	24	99
C. Carra	25	24	24	24	97
R. J. Jackson	23	24	25	24	96
C. H. Graham	25	22	25	24	96
W. H. Kendell	25	23	24	23	95
W. J. Hemphill	25	22	25	23	95
R. Miller	25	24	24	21	94
A. Dunlop	22	22	25	24	93
J. Sweetman	25	21	24	22	92
C. Culton	22	21	25	22	90
G. Miller	24	25	21	20	90

Layered Crop.

Probably never before have such rank crops of Federation wheat been seen in the Wimmera. Layered patches were observed in most heavy crops. Little trouble is experienced in dealing with these, now



A Tall Crop of Federation—Mr. W. J. Hemphill's.

the reaper threshers have been installed, but there is always loss when wheat goes down. The grain is generally light, but this year the cut-worms ate many of the heads off as well. Rank crops can be avoided by late sowing or by feeding-off. This year, of course, many farmers have been without sheep, so that feeding-off was out of the question. Messrs. Miller Brothers, however, fed the whole of their crop off to sheep, with profit to the sheep and the crop this year. Sheep were on one 80-acre paddock as late as the end of September, yet the yield

was heavy. This indicates the vigor of the wheat plant in a season like that just passed. As a rule, a quick nip in July or August is all that may be safely permitted.

But late sowing is also a valuable and safe method of keeping crops on this class of land down to a reasonable height. As a rule here, there should be no need to commence seeding until July—the practice found most profitable at Horsham. Crops sown on this country at the end of May and early in June are bound to be rank unless “sheeped.”

Mr. Newall cites an August sown crop last year, which yielded fifteen bags to the acre.

The later the sowing the heavier should the rate of seeding be, and the heavier the dressing of manure. Mr. Newall used 186 lbs. superphosphate to the acre with the above crop.



An effective stable—Mr. C. Carra's, Rupanyup.

Fallowing Methods.

There is apparently no one system of creating and maintaining the fallow which is applicable to the whole of the black soils in the Wimmera. The shallower portions in the northern section must be stirred less deeply than those, say, at Horsham and Murtoa, or on the Lallat plain, Rupanyup. On the shallower types the harrows occupy an important place among the cultivation implements. For the heavier soils, with their more vigorous weed growth, the scarifiers must be more largely relied upon, though judicious use of the harrows is also necessary. Whereas a mulch some $2\frac{1}{2}$ inches deep is all that is desirable on the shallower soils, 3 to $3\frac{1}{2}$ inches is not out of place elsewhere.

Sheep and Consolidation.

Sheep are very useful in compacting the under layers of Wimmera soils, which are naturally friable and cake with difficulty. Many

successful wheat-growers, among whom are Messrs. Smith Brothers, of Horsham, make it a practice to thoroughly tramp the fallows with sheep, quite apart from "sheeping" the crop hard back and deriving further consolidation then.

Where the fallow is tramped, it must be remembered that scaring deeper than usual is necessary when fallowing. The sheep on the fallow cause part of the dust mulch to gradually adhere to the seed bed. The net result is that the mulch is often left too thin and the soil may crack badly.

Sowing New Land without Fallow.

It sometimes happens in the Wimmera that those farming new land cannot afford to wait eighteen months for their first wheat crop. This wait would be necessary if bare fallowing were practised. It is generally recognised that the sweetening effect of a bare fallow is essential to success on new land, but that this is not always the case has been proved by a returned soldier who selected part of Warrenooke Estate and sowed wheat without fallowing, and with complete success. The crop was, however, not so heavy as some, but nevertheless it provided a quick return, which was the object required. It is probable, however, that the good season was a large factor in the success of this crop.

Tenant Farmers.

Recently land has been rented at Horsham up to as high as 23s. an acre. Rents of this sort have tempted many farmers to let their farms and return to the city. But the system of agriculture which it involves has its drawbacks. The tenant system in America has been found to stand for soil exhaustion, weed extension, and dilapidated improvements. Because of the high rents the tenant farmer is forced to look upon the soil as a sort of mine to be prospected and ultimately cast aside when exhausted. He looks also upon the farm only as a temporary home, and consequently buildings and fences fall into disrepair. The evil will be remedied when the owners realize that under the present system their land will steadily depreciate in value. What they gain in immediate rent they may lose in the long run in depreciation.

Contracts with tenants should clearly specify the rotation system to be followed, the amount of manure to be applied, and should provide for repair of implements. But these concessions cannot be exacted without reductions in the present rents. The rates at Rupanyup are so far on a much lower scale than those at Horsham, and consequently the tenants are able to pursue a better system of agriculture.

In conclusion, I desire to thank the secretary, Mr. J. W. Chapman, for his courteous assistance during the judging campaign.

DIMBOOLA CROP AND FALLOW COMPETITION.

Report of the Judge, I. M. Tulloh, Field Officer.

The town of Dimboola, situated as it is on the edge of the "Wimmera Plains," includes in its district, not only some of the heavy "Black Wimmera Soil," but also a large tract of Mallee, with its variations from heavy fringe country to the loose white desert sand. The local Agricultural and Pastoral Society, when arranging the schedule for the Annual "Crop and Fallow" Competition, has, therefore, to cater for a wide range of conditions. The competition this year was divided into eight sections—four for Mallee, and four for land, "other than Mallee"; the entries in the latter class were mainly heavy, black soil. The competitors were again divided into large and small farms—"over" or "under" 640 acres.

The number of entries this season was well above the average, and seven more than last year.

The season was a favorable one, and the sound methods generally applied throughout the district enabled the growers to take full advantage of it.

The rainfall for the year to the end of November was 16 inches, of which approximately 9 inches fell during the growing period of the crop. Rust made its appearance in early November, but, except in one or two isolated cases, did not materially affect the yield.

SECTION 1.

BEST 150 ACRES OF GROWING CROP OF WHEAT, ON MALLEE LAND, FOR GROWERS FARMING 640 ACRES OF LAND OR OVER.

Name.	Yield.	Purity.	Freedom from—		Evenness.	Total.
			Disease.	Weeds.		
Maximum Points	40	20	15	15	10	100
E. Schaefer	30	16	13	11	8	78
C. A. Mibus	29	16	11	11	8	75
E. Elsom	27	14	10	11	8	70

Mr. Schaefer's winning crop consisted of 100 acres of Red Russian and 50 acres of Federation. The land had been ploughed during July and harrowed immediately. It was spring-toothed near the end of October, harrowed in February after 2 inches of rain, and spring-toothed in April. Part was sown with the scarifier working in front of the drill, and the remainder sown with the combine. Some of that "combined" was also scarified previously—100 lbs. of both seed and manure were sown per acre. All the crop was harrowed a day or so after sowing, which was commenced at the end of May and was continued till the third week of June. The crop of Federation was hardly as thick as that of Red Russian, which is a popular variety on the Mallee soils of the district, and in this instance had stood well, and

had developed into a dense crop, well headed, with the bigger proportion of ears carrying 3 grains per spikelet. A number of weeds were present, chiefly confined to wet patches, which were also the cause of a certain amount of unevenness.

Mr. Mibus' crop of Federation and Huff's Imperial was grown on land which had been fallowed in June, harrowed a fortnight later, scarified in October, and again in April. It was again scarified in front of the drill, when 70 lbs. of both seed and manure were sown per acre. Sowing was done during early June, and was followed by the harrows. This was a nicely-grown crop; points being lost mainly owing to the presence of ball smut and weeds, the latter chiefly wild oats.

Mr. Elsom had fallowed during September, ploughing to a depth of 3 to 3½ inches. The land was harrowed immediately after, but even then the sod had set into extremely hard lumps. It was scarified during October and November, and again in March. The crop was put in with the combine between the end of May to the middle of June, and harrowed and cross-harrowed within a few days of sowing; 93 lbs. of seed and up to 105 lbs. of super. were sown per acre. Smut was also present here, and there was some take-all, probably due to the later fallowing; otherwise it was a nicely-grown crop for this class of land.

SECTION 3.

BEST CROP OF 100 ACRES GROWING ON MALLEE LAND, ON A FARM NOT EXCEEDING 640 ACRES.

There were two entries in this section, those of Messrs. J. G. Glatz and G. C. Howland.

Name.	Yield.	Purity.	Freedom from—		Evenness.	Total.
			Disease.	Weeds.		
Maximum Points	40	20	15	15	10	100
G. S. Howland	31	16	12	14	9	82
J. G. Glatz	27	18	11	13	8	77

Mr. Howland showed a fine crop of Federation, very even, and comparatively free from weeds. It was tall and nicely headed; there was, however, a fair number of foreign varieties and odd barley plants present.

Ploughing had been done in July, and the land harrowed immediately after. It was scarified in October, and again at the latter end of March, and early April. The crop was put in with the combine in early June, with the harrows following closely; 90 lbs. of seed and 94 lbs. of manure were sown per acre.

Mr. Glatz's main crop was Red Russian—other varieties grown being Dollar, Federation, and Major. The paddock of Red Russian had been ploughed in July, followed immediately with the harrows. It was scarified in October, again in March. With the scarifier working

in front of the drill it was sown at the end of June, with 90 lbs. of seed and 100 lbs. of manure per acre.

The land on which the other varieties were grown had been ploughed in early June and then harrowed. It had been scarified early in September, and again at the beginning of October, spring-toothed three weeks later, and harrowed during the first week of November. It was scarified in March, and again before sowing. It was drilled during the latter end of June, and harrowed a day or so behind the drill; sowing 100 lbs. of seed and 120 lbs. of manure per acre. The Red Russian was a nice even crop, but rather light compared to that of the winner, while smut was fairly prevalent. The other varieties, grown in another paddock, were dense and heavy in many places, but included light patches mainly on low-lying parts, where water had been held during the winter months. A notable feature of Mr. Glatz's crops was the purity of type maintained in the different varieties, very few foreign heads being present.

SECTION 5.

BEST 150 ACRES OF WHEAT GROWING ON LAND OTHER THAN MALLEE ON A FARM OF 640 ACRES OR OVER.

There were six competitors in the section, and all the crops shown were exceptionally fine.

Name.	Yield.	Purity.	Freedom from—		Evenness.	Total.
			Disease.	Weeds.		
Maximum Points	40	20	15	15	10	100
Alf. Sallmann	40	19	13	14	10	96
T. Feery	38	18	14	15	10	95
P. H. Muller	33	16	14	12	9	84
Ben. Ward	36	15	11	13	9	84
Warner Bros.	36	15	12	11	8	82
D. S. Anderson (withdrawn)						

It will be seen from the award of points that the contest for first place was very keen. The two leading crops were very fine, but as a spectacle Mr. Sallmann's crop was more impressive. It was sown a little earlier, and was a tall grown crop, and at the time of judging was standing well. It was exceptionally free from foreign varieties, even and dense.

Mr. Feery's crop, though not so imposing, was one that would appeal more to the wheat-grower. It was just a nice medium height, very even and dense, free from weeds, and contained very few foreign varieties; smut was entirely absent, but unfortunately it was rather badly affected with rust.

Mr. Sallmann's crop had been grown on land which had oats and barley drilled on the stubble two years before, having been put in with the combine with 100 lbs. of manure per acre. This crop was fed off during August and September. It had been summer-fallowed the following April and fallowed twice before July, when it was scarified and harrowed. It was then left till autumn, when it was harrowed three times—in February, March, and

April. It was spring-toothed in May, and the crop put in with the combine during the first three weeks of June, and harrowed afterwards. Seventy-five lbs. of Federation seed and 100 lbs. of manure were sown per acre.

Mr. Feery's crop was grown on winter fallow, ploughed during July, and harrowed and crossed immediately after. It was scarified early in October, and harrowed after a heavy rain during January. It was again scarified after heavy rain in April, and was sown with the combine at the latter end of June, putting in 90 lbs. of seed and 112 lbs. of manure per acre. Each of these crops had been sown from seed obtained from the Longerenong College two years before.

Mr. Muller's crop was grown on winter fallow, and consisted of Federation and Penny. This was a nicely-grown crop, containing very little smut, but lighter than the two leading ones.



Mr. E. Schaefer's Crop of Red Russian.

Mr. Ward's crop was of Federation, shown in two paddocks; one carrying a much heavier crop than the other, though both had apparently received similar treatment. Eighty lbs. of seed and 95 lbs. of manure had been sown per acre during June. This crop had been grown on summer fallow, ploughed in March and April, harrowed before scarifying in August. It received three scarifyings in autumn, one after rain at the end of February, another in April, and the last in front of the drill.

Messrs. Warner Brothers' crop was also a nice heavy one, a little lighter on the rising ground than on the flats. The treatment of the fallow differed from those of the other competitors, in that it had not been ploughed—the scarifier being used instead. Part had been scarified in May and part in July. It was all scarified at the latter end of that month, and again in September. It was spring-toothed twice during October and early November, and again after rains in

March. It was worked again in May and drilled with the combine during June, sowing 90 lbs. of seed and 140 to 145 lbs. of manure per acre. The later-sown crop here showed to advantage. Though shorter, it was more dense, and contained very few weeds, in comparison with the early-sown portion.

SECTION 7.

BEST CROP OF WHEAT OF 100 ACRES, ON LAND OTHER THAN MALLEE, GROWN BY A FARMER OWNING NOT MORE THAN 640 ACRES.

Name.	Yield.	Purity.	Freedom from—		Evenness.	Total.
			Disease.	Weeds.		
Maximum Points	40	20	15	15	10	100
E. Harders	39	17	15	13	10	94
O. Hermann	36	18	15	14	10	93
W. G. Harders	37	16	15	13	8	89
C. E. Nuske	33	17	14	14	10	88
A. Ross	36	16	14	13	8	87
H. F. Budde	36	17	11	13	9	86
Leo. Nettlebeck	30	18	13	11	8	80

There was again very keen competition in this section. Mr. E. Harders' crop was a very attractive one, dense, of medium height, even and well headed. There were very few foreign varieties present, and it was comparatively free from weeds.

Mr. Hermann's crop was of Penny and Federation. The Penny was very pure and even. Like Mr. Harders' crop, there was no trace of ball smut, and weeds were almost entirely absent. The Federation was hardly as true to type, and, growing on rising ground, it was scarcely as dense as the Penny, which was growing on a heavy flat.

Mr. Harders' crop was sown with Federation seed obtained from Longerenong College two years ago—85 lbs. of seed and 85 lbs. of manure had been sown per acre. It was grown on winter fallow which had been ploughed in July, harrowed three times during August, spring-toothed early in October, and harrowed shortly after. It was harrowed again in April, spring-toothed early in May, then harrowed and a part harrowed again. It was put in with the combine at the middle of June.

Mr. Hermann had summer-fallowed, ploughing being done during March and April. The land was scarified early in July and harrowed immediately after. It was scarified in August, and again in October, then harrowed. After autumn rains it was again scarified and harrowed. Working single-handed, Mr. Hermann commenced sowing during the first week in June, scarifying before drilling. After sowing half the crop in this manner, he had the drill connected with a combine, and sowed the remainder during the third week of June. Eighty-eight lbs. of seed and manure were sown per acre.

Mr. W. G. Harders' crop was sown on winter fallow, which received five workings before harvest, and three in autumn before sowing. It

was put in with the combine during the latter part of June with 85 lbs. of both seed and manure. This crop was also free from smut, and was a nice medium height. There were few foreign varieties present, but points were lost owing to the presence of odd barley plants.

Mr. Nuske grew four varieties—Penny, Gallipoli, Huff's Imperial, and Federation. They were sown in that order with 80 lbs. each of seed and manure per acre.

Part of Mr. Ross' crop was sown on summer fallow, which had been worked up with the scarifier in April to a depth of 3 inches. The remainder had been ploughed in July. Heavy applications of seed and manure had been made—100 lbs. and 120 lbs. respectively per acre. This was also a very creditable crop. Mr. Budde's crop scored well in points, except for those deducted owing to the prevalence of ball smut. This crop had been sown at the latter end of June with 90 lbs. of seed and manure per acre.

Mr. Nettlebeck's entry consisted of 40 acres of Red Russian and 60 acres of Dollar. He was handicapped to a large extent owing to the ground being considerably lighter than that of the other competitors. The Red Russian was a nicely grown crop, though light, due to the nature of the soil. The Dollar was heavy and even at one end, but became lighter with the soil towards the other end of the paddock. Seventy-five lbs. of seed and 1 cwt. of manure had been sown per acre.

The Fallow.

SECTION 2.

BEST 150 ACRES OF FALLOW ON MALLEE LAND EXHIBITED BY A FARMER OWNING 640 ACRES OF LAND OR OVER.

There was but one entry in this section, that of Mr. E. Schaefer, who showed a 165-acre paddock, which had been ploughed in August, harrowed and cross-harrowed immediately. It had been scarified and then harrowed in September. Part had been scarified, and the balance spring-toothed at the end of October. The soil was chiefly loamy with occasional red patches. Care had been taken not to work the surface too finely, while the ridged surface left by the last working would prevent blowing to a considerable extent.

Name.	Mulch.	Molsture.	Weeds.	Cultivation.	Total.
Maximum Points	25	25	25	25	100
E. Schaefer	23	22	20	24	89

SECTION 4.

BEST 100 ACRES OF FALLOW ON MALLEE LAND EXHIBITED BY A FARMER OWNING NOT OVER 640 ACRES.

There was again but one entry in this section, that of Mr. J. G. Glatz. This was a 150-acre paddock, the bulk of which was loamy, but it contained a number of stiff red and grey patches. These had still been wet when ploughed, and had set into unbreakable hard lumps,

which subsequent workings had failed to break down. Apart from these patches, the remainder of the fallow was in excellent condition, and had been very thoroughly worked. Ploughing had been done during July and early August, after which it was harrowed and cross-harrowed immediately. It then received three scarifyings, one in September, the next during the middle of October, and again early in November. It was harrowed at the latter end of that month, and again after rain during the early part of December.

The surface was in nice tilth, and had worked down nicely except on the patches mentioned above.

Name.	Mulch.	Moisture.	Weeds.	Cultivation.	Total.
Maximum Points	25	25	25	25	100
J. G. Glatz	24	24	25	25	98

SECTION 6.

BEST 150 ACRES OF FALLOW ON LAND, "OTHER THAN MALLEE," FOR FARMERS OWNING 640 ACRES OF LAND OR OVER.

This was contested by Messrs. E. Mibus and P. H. Muller. The winner was Mr. Mibus, who exhibited a very fine fallow, the only defect being in the depth of the mulch, which was a little on the shallow side; otherwise it was practically perfect, being well consolidated underneath, free from weeds, and in fine mellow condition.

Mr. Muller's fallow was also a good one, but just lacked those minor details which were present in the winning fallow. The moisture and mulch were both good. A few weeds were present, mainly thistles. The consolidated surface was hardly as even as that on the fallow of Mr. Mibus, while the degree of consolidation was more variable.

Name.	Moisture.	Mulch.	Weeds.	Consolidation.	Cultivation.	Total.
Maximum Points	20	20	20	20	20	100
E. Mibus	19	18	20	20	20	97
P. H. Muller	19	19	17	16	18	89

Mr. Mibus had worked his fallow very thoroughly. It was summer fallow, ploughed in April, scarified in July, spring-toothed in August, scarified in September. During October it received two cultivatings with the spring-tooth, the second working being given immediately after and across the previous one. It was then harrowed straight away, and after heavy rains during the first week of December it was given another harrowing.

Mr. Muller had ploughed during August and the first week of September, and then harrowed and crossed immediately. It was scarified during October, and harrowed twice during November.

SECTION 8.

BEST 100 ACRES OF FALLOW ON LAND OTHER THAN MALLEE EXHIBITED BY
FARMERS NOT OWNING OVER 640 ACRES OF LAND.

Name.	Moisture.	Mulch.	Weeds.	Consolidation.	Cultivation.	Total.
Maximum Points	20	20	20	20	20	100
E. T. Nuske	20	20	20	20	20	100
H. F. Budde	19	17	19	19	20	94
Geo. Nettlebeck	18	18	20	18	19	93

These three fallows were all in splendid order, that of the winner receiving the maximum points. It was all that could be desired, containing an abundant supply of moisture, well protected by a mulch of $2\frac{1}{2}$ inches, regular in depth, and in a nice tilth. It was free from weeds, and had good consolidation of the underlayers. This was summer fallow, ploughed during April and May, harrowed three times during July, and again in September. It received two workings with the cultivator in October, and had been given three harrowings later—two after rains in November, and another after the early December rains.

Mr. Budde's fallow was ploughed in March, and harrowed immediately after, scarified early in May, and harrowed at the end of that month. It was scarified and harrowed during July, harrowed early in September, scarified at the end of September, and harrowed once more. In November it was scarified again, and received two more workings with the harrows, one shortly after scarifying, the other after rain at the end of the month. This fallow was in nice condition; there were a few weeds on one end of the paddock, while the only main defect was in the mulch, which was hardly deep enough.

Mr. Nettlebeck was again handicapped owing to the nature of the soil on his fallow, which was much lighter ground than that shown by the other competitors. It contained many red and grey patches, which present many difficulties in working. In awarding points, these conditions were taken into consideration. Ploughing had been done during June and July, and followed by the harrows. It was scarified and harrowed during September, and received similar treatment in October. It was again harrowed after rain early in December. Considering the nature of the soil, this fallow was in good condition. There were no weeds present, and on the more fertile portions the mulch was in good order and protected a good supply of moisture below.

The Crops.

All the crops exhibited were of a high standard. Those winning in the various classes were exceptionally fine, and reflected the up-to-date methods which are generally practised throughout the district. In such a favorable season, the response of crops to any special treatment they may have received is considerably modified. This has been especially noticeable in the manurial trials conducted in various parts of the

Wimmera. A review of the treatment of the winning crops, however, shows that heavy applications of seed and manure have again scored heavily.

Competitor.	Class of Land.	Time of Fallowing.	Quantity of—	
			Seed.	Manure.
E. Schaefer ..	Mallee	July	100 lbs.	100 lbs.
G. Howland ..	Mallee	July	90 lbs.	94 lbs.
A. Sallmann ..	Heavy black soil ..	April	75 lbs.	100 lbs.
E. Harders ..	Heavy black soil ..	July	85 lbs.	85 lbs.



Scarifier, with weed-knife attached, specially suited to deal with paddy-melons.
(Working on Mr. D. S. Anderson's fallow.)

Mr. Schaefer's land is only a medium strong soil, yet he finds the heavy seeding and manuring profitable, and it is to these factors that he attributes the density of his crop this year, which compared very favorably with many crops grown on heavy soil.

Mr. Howland applied a heavy seeding, and a fairly heavy dressing of manure. His soil was strong Mallee, and the crop was a very fine one.

While Mr. Sallmann's crop was sown with 100 lbs. of manure, it must be remembered that a large proportion of that sown with the grazing crop before fallowing was still available for the wheat crop. This was a splendid crop, and has been described previously, while Mr. Ferry's crop, placed one point behind it, was sown with 90 lbs. of seed and 112 lbs. of manure per acre.

Mr. Harders' crop was sown with a lighter quantity of manure; it was well seeded, however, and was grown on a heavy black flat. As has been previously pointed out, the season modified the effects of heavy manuring, but tests conducted over a number of years show that, while the differences are less marked in good seasons, the heavy applications

of manure up to 2 cwt. per acre prove so profitable in less favorable seasons that the average yield per acre over a number of years is several bushels in their favour.

The cropping systems adopted throughout the district leave little to be desired. Summer fallowing, which has shown up so conspicuously among the winning crops throughout the Wimmera of recent years, is widely practised, while late sowing, another important factor to success, has taken its place in the routine.

A number of crops inspected were entirely free from smut, and others were only slightly affected. There were several, however, which were infected to such an extent as to materially affect the yield. As all the crops were sown with pickled seed, it can only be inferred that in some cases pickling had not been done carefully.



Mr. A. Sallmann's Home.

Methods of pickling are detailed in the report of last year's competition by the Chief Field Officer, Mr. H. A. Mullett, and if these instructions are followed there should be no risk of smut occurring in the ensuing crop. It is a wise precaution to soak the bags in the pickle also, as re-infection frequently takes place from this source. Where the crop has been smutted the previous year the drill should also be disinfected with a formalin solution (1 in 400).

The Fallow.

The wide variation in the nature of Mallee soils prevents any definite routine being practised in fallowing. The stronger Mallee soils respond to thorough cultivation, but in working this class of land the condition of the fallow has to be closely watched if the best results are to be obtained.

On the more sandy soils the common practice is to harrow after ploughing, and then spring-tooth only when necessary to control the growth of weeds. The ridged surface left by the spring-tooth helps to prevent "blowing" to some extent, especially if worked at right angles to prevailing winds.

Fallowing on Heavy Soils.

The success of summer fallowing and the more even distribution of the work in so doing has led to its popularity throughout the Wimmera, and it is the exception to meet with a farm where at least a portion of the land is not summer-fallowed.

While there is a general similarity in the methods employed in working the fallows, there are occasional minor variations in methods which lead to wide differences in results.

It is frequently noticed that one farmer will bring his fallow into excellent condition with a far less amount of work than another. A case in point is the fallow exhibited by Mr. E. G. Nuske. This was in perfect condition, and though it received six harrowings altogether, it had been but twice worked with the cultivator—given in succession during October.

A fault most commonly met with is an insufficient depth of mulch. In order to afford protection to the underlayers during summer and autumn months, it is necessary that this covering or mulch should be $2\frac{1}{2}$ inches deep. If the depth be less the ground in a normal season will crack in autumn, and big losses of moisture through evaporation occur. This is a point that has to be closely watched when the spring harrowings are given. The harrows are very effective in consolidating the underlayers, caused by the fine particles of soil running down to the points of the tynes, where they quickly settle and bind together. When it is intended to harrow frequently, it is necessary to make the early spring working a deep one. Mr. Nuske's success is due to this. In cultivating twice, the second immediately after the first one and across it, be worked deeply—a good 3 inches—so that after the subsequent harrowings, not only was the fallow well consolidated below, but a good depth of mulch still remained to prevent evaporation.

The combined cultivator drill is becoming a very popular implement for working the fallow, and is specially adapted for late spring workings. For this purpose the 4-inch points are used. These deal effectively with young weeds, and at the same time cut the mulch out to the required depth without opening up the soil to the same extent as the scarifier, while the finely-ridged surface left after working prevents the fallow being beaten down by heavy rains—a feature which was noticeable on many Wimmera fallows this season. These fallows had been harrowed after rain in November, but heavy rains a fortnight later had flattened the surface badly, and, occurring in the middle of hay carting, time could not be spared to give the harrowing which was needed to prevent the fine surface from settling down.

I desire to thank the President and officers of the Society, especially the Secretary, Mr. C. Bennett, for the arrangements made in connexion with the judging, which, with the co-operation of the competitors, enabled the work to be carried out so successfully and pleasantly.

FALLOW COMPETITION, BEULAH, MARCH, 1922.

Report of the Judge, J. Keane, B. Ag. Sc., Science Field Officer.

The judging of the annual fallow competition conducted by the Beulah Agricultural and Pastoral Society took place in March, having been postponed owing to heavy rains during the judging of the crops last November. The competition was again divided into two sections, Section I. being confined to returned soldier settlers, while Section II. was open to all farmers of the district.

Since 4th December to the time of judging (March) only 34 points of rain had been recorded at Beulah, so that the fallows were subjected to a severe test. Consequently the only ones showing a high moisture content were those which had been judiciously worked and were protected by a good mulch.

With the light sandy soils of the Mallee one of the greatest difficulties in fallowing is to prevent the surface mulch from drifting. In many cases the whole of the loose sand is blown from the fallow into adjoining paddocks or on to the roads. That this drifting can, to a considerable extent, be avoided was one of the principal features noticed during the judging of the competition this year. In several cases neighbouring fallows, on the same class of land and under exactly similar conditions, were observed in which one had a nice, well-formed mulch, with practically no drifting, while on the other the whole of the loose surface soil had been blown away. The difference in each case was due to the methods employed in working the fallows. Where the surface had been left in a fine level condition by the harrows there was nothing to hinder the movement of the sand, with the result that after a dry spell the first heavy winds caused drifting.

On the other hand, where the surface had been worked last with the spring-tooth cultivator, the ridges left by this implement intercepted any moving sand, and drifting was reduced to a minimum, particularly where the ridges were across the direction of the prevailing winds.

A few of the fallows shown were badly infested with paddy-melons. In some cases these were being eaten off by horses and sheep, neither of which appear to suffer any ill-effects providing they are not confined to the paddy-melons, but have access to grass or stubble paddocks at the same time. A statement often heard is that paddy-melons are a good sign on a fallow, as they show that there is plenty of moisture present. But the important thing is to keep the moisture in the fallow, and where weeds of any kind are growing they are using up that moisture and robbing the succeeding wheat crop.

Details of Results.

SECTION I.—BEST 100 ACRES OF FALLOW, FOR RETURNED SOLDIER SETTLERS ONLY.

In this section there were ten entries. Considering the dry season and the fact that the settlers were too busy with the haymaking to get on to the fallows after the rains in November and early December, those shown were of a high standard, and reflect considerable credit on these new settlers.

TABLE I.

Name.	Moisture.	Mulch.	Cultivation.	Weeds.	Total.
C. Hunt, Beulah West ..	22	22½	22	21½	88
J. Nunn, jun., Reedy Dam..	22	21	23	20	86
J. Bryant, Beulah ..	20	21	20	24	85
P. Lawler, Reedy Dam ..	21	22	22	19	84
C. H. Guley, Beulah West..	20	22	20	21	83
F. Cullen, Beulah West ..	18	22	20½	20½	81
J. Hunter, Brim ..	19	21	21	17	78
E. Pendlebury, Goyura West	17	20	20	21	78
M. Carmichael, Goyura West	17	18	19	23	77
V. P. Smith, Beulah West..		With	drawn		

Mr. C. Hunt's fallow, which is awarded first place, consisted of 60 acres of summer fallow, plus 40 acres which have been under fallow since July, 1920, Mr. Hunt not having had time to sow this portion last year.

The 60 acres of summer fallow had been ploughed in January, then harrowed after a rain in April. In July the whole paddock (which consists of 200 acres) was spring-toothed. As the paddock is not fenced, sheep could not be run on the fallow, so that the implements had to be kept going to keep the rubbish down. After the spring-tooth the paddock was scarified, then skim-ploughed, and finally given three more workings with the spring-tooth, the last being at the end of November. The 40 acres which were ploughed in July, 1920, are on the way home from the larger paddock, and have been intensively worked. The fallow, which was protected by a good mulch, had a well consolidated, fairly level bottom and a high moisture content. There were a few paddy-melons present.

Second place goes to Mr. J. Nunn, jun., who showed a very good fallow, and third place to Mr. J. Bryant.

The remaining fallows lost points for such faults as low moisture contents, inefficient mulches, and the presence of weeds.

SECTION II.—BEST 100 ACRES OF FALLOW—OPEN TO ALL FARMERS OF THE DISTRICT.

Name.	Moisture.	Mulch.	Cultivation.	Weeds.	Total.
A. T. Couzner, Galaquil ..	23	23	22	24	92
W. T. Fish, Beulah ..	22½	22	23	23	90½
C. Hunt, Beulah West ..	22	22½	22	21½	88
W. J. Collins, Beulah ..	19	22	22	23	86
J. Bryant, Beulah ..	20	21	20	24	85
A. E. Jende, Beulah ..	18	20	20	24	82
W. McAllister, Galaquil ..	18	19	19	25	81
E. V. Schneider, Beulah ..	18½	21	20½	20	80
F. H. Marshman, Brim ..	18½	20	20½	20	79
Schneider Bros., Beulah ..	19	20	21	19	79

The first place is awarded to Mr. A. T. Couzner, who showed 100 acres of excellent fallow. The moisture content was, considering the season, extremely good, and the fallow was protected by a well-formed, mellow mulch. Very few weeds were present.

The land was worked up with the scarifier during July, and harrowed immediately after. It was again scarified during August and September, with the harrows dragging behind. This was followed by the spring-tooth, and another stroke of the same implement was given in November. The last working of the cultivator was in a north-and-south direction, leaving ridges at right angles to the prevailing westerly winds. This has effectively prevented any drifting.

The second prize fallow, shown by Mr. W. T. Fish, consisted of two 50-acre paddocks. One of these was practically an ideal fallow, while in the other the mulch was set down in places, and consequently some of the moisture had been lost by evaporation.

Mr. C. Hunt obtains third place with the fallow already described under Section I.

The other competitors all showed good fallows, but lost points for similar faults to those under the previous section.

In conclusion, I desire to thank the secretary, Mr. A. J. Williams, Mr. W. J. Wallsgot, and Mr. Redding for their assistance and co-operation during the judging of the competition.

SOME RESULTS OF EXPERIMENTAL WORK OF THE FIELD BRANCH, DEPARTMENT OF AGRICULTURE.

Increasing Wheat Yields.

RESULTS OF MANURIAL EXPERIMENTS IN WESTERN WIMMERA.

There are several millions of acres of light soils in the south-west portion of the County of Lowan, which are mainly used for grazing purposes. Some wheat and oats, however, are grown in the vicinity of Goroke. A few years ago, the Closer Settlement Board acquired a number of large estates in the district, and settled them with returned soldiers, who, in many cases, are growing a proportion of cereals. Portion of Mortat Station was settled in this way. Before this estate was subdivided, the Agricultural Department, at the instance of the local Agricultural Society, secured 10 acres of the land, and established an experimental plot. This area was fallowed in 1920, and the results of the first crop are now to hand.

RESULTS.—Plots, each $\frac{1}{4}$ acre. Sown 26th May, on fallowed land, with Federation wheat, at the rate of 70 lbs. per acre—

Treatment.	Yield per Acre.
No manure	5.9 bushels per acre.
Superphosphate, 1 cwt. per acre	14.7 " "
Superphosphate, 2 cwt. per acre	19.3 " "
Basic phosphate, 1 cwt.	13.3 " "
Superphosphate, 1 cwt., and gypsum, $1\frac{1}{2}$ tons, per acre	24.8 " "

The benefit conferred by phosphatic manures of the water soluble type is well known to Victorian agriculturists, but the results obtained in this district are more marked than elsewhere. It is evident that here successful crops could not be grown without the aid of manure. A dressing of 1 cwt. of superphosphate increased the yield by 8 bushels per acre, or practically 150 per cent. When 2 cwt. of superphosphate was applied, the increase was 13.4 bushels per acre, or 227 per cent. Basic phosphate, a manure of rather less soluble character, also gave a substantial increase, but not so good as an equal quantity of superphosphate. The best results of all were obtained by the use of gypsum with superphosphate. Thus the plot treated with gypsum 1½ tons, and superphosphate 1 cwt. per acre, yielded 24.8 bushels per acre, an increase of 18.9 bushels as compared with the unmanured plot, and 10.1 bushels per acre more than where superphosphate was applied by itself.

This is the first instance in Victoria, in official tests with wheat, where gypsum has given such beneficial results. The reason for its success at Goroke is probably due to its favorable action in ameliorating a cement layer which exists at about a foot deep under the light soils there.

Notwithstanding, however, the success of gypsum, the application of superphosphate at the rate of 2 cwt. per acre by itself proved the most profitable dressing. Valuing the wheat at 4s. a bushel, and the superphosphate at 6s. 6d. a cwt., the net profit due to the use of 2 cwt. of superphosphate amounted to 40s. 7d. per acre, after paying for the fertilizer out of the increased crop. The average application of superphosphate used in the district is about 80 lbs. per acre. In view of these results, obviously, it could be increased with substantial profit.

With regard to gypsum, its high price at the present time is due to the limited demand. Large supplies exist naturally in the Mallee, and it is probable that if efficient handling methods were installed, the price could be considerably reduced.

It may be pointed out, too, that it is not likely that the dressing of gypsum will have to be repeated for a number of years; hence, the cost per annum is considerably reduced.

The following table sets out in detail the net profit due to each dressing of manure tried:—

Treatment per Acre.	Increase due to Manure.	Value of Increase, at 4s. per Bushel.	Cost of Manure.	Profit per Acre due to use of Manure.
	Bushels.	s. d.	s. d.	s. d.
No manure	..	..	..	..
Superphosphate, 1 cwt. per acre ..	8.8	35 2	6 6	28 8
Superphosphate, 2 cwt. per acre ..	13.4	53 7	13 0	40 7
Basic phosphate, 1 cwt. ..	7.4	29 7	6 0	23 7
Superphosphate, 1 cwt.; gypsum, 1½ tons	18.9	75 7	81 6	5 11 loss
<i>Recalculated profit, assuming gypsum lasts five crops.</i>				
Superphosphate, 1 cwt.; gypsum, 1½ tons	18.9	75 7	21 6	54 1 profit

Prolific Wheat Crops.**RESULTS OF EXPERIMENTAL WORK AT NHILL.**

The results of the experimental plots conducted for the Department of Agriculture by Mr. W. E. Dahlenburg on his farm at Salisbury, are now to hand.

The plots were sown on well-worked fallowed land, and some splendid yields were harvested. The whole field of about 6 acres averaged 46.6 bushels, including two-thirds of an acre sown without any manure. The new Departmental crossbred, Gallipoli, gave the best yield, viz., 51.4 bushels per acre. The average for the past two years at Salisbury for this variety is 52.95 bushels per acre. Wannon, a new selection from Federation, was next best with 50.7 bushels per acre. The following table indicates the results:—

Plots, each one-third of an acre in area. Sown 27th June, 1921, with 75 lbs. wheat, and 1 cwt. superphosphate per acre—

Gallipoli	51.4 bushels per acre.
Wannon	50.7 " "
Huff's Imperial	49.8 " "
Federation	46.5 " "
Dollar	46.4 " "
Penny	45.2 " "
Crossbred L7063	44.7 " "

NOTE.—H. Huff's Imperial, raised by Mr. A. Huff, of Doon, closely resembles Wannon, but there appear to be slight points of difference. Crossbred L7063 looked very promising, but the grain was somewhat pinched.

A further series of tests was conducted with various dressings of phosphatic manure applied to Federation wheat. Portion was sown at the normal seeding time for the district, and an identical portion a month later. The results were slightly in favour of the later sowing for most of the applications made. Details of the results are appended:—

Federation Wheat Manured as under—	Yields per Acre of Plots Sown normal Sowing time, 18.6.21.	Yields per Acre of Plots Sown one month later, 18.7.21.	Increase due to Late Sowing.
	Bushels.	Bushels.	Bushels.
No manure	41.9	43.8	1.9
Superphosphate, $\frac{1}{2}$ cwt. per acre	45.3	45.3	Nil
Superphosphate, 1 cwt. per acre	45.3	46.2	.9
Superphosphate, $1\frac{1}{2}$ cwt. per acre	47.4	48.2	.8
Superphosphate, 2 cwt. per acre	47.3	46.8	Decrease .5

It will be noticed, incidentally, that the yield of the plot untreated with fertilizer is extraordinarily high, as was the case on this field the previous year. It is a result which is most uncommon in the Wimmera, and one which is probably accounted for by the favorable growing

weather experienced at Nhill late in the season, as well as to the residual effect of a heavy dressing of manure given this field when it was last cropped. The most profitable dressing of fertilizer applied was $1\frac{1}{2}$ cwt. in both series of plots, as shown by the following table. This is considerably in advance of the amount used locally. The response to manure generally was lower than that which is usual in the Wimmera.

PROFIT SHOWN BY MANURES APPLIED TO FEDERATION WHEAT
SOWN 18TH JUNE, 1921.

Normal Seeding Time.

Federation Wheat Manured as under—	Increase due to Manure.	Value of the Increase at 4s. a Bushel.	Cost of Fertilizer.	Extra Profit due to Manures.
	Bushels per acre.	s. d.	s. d.	s. d.
No manure	..	..	..	..
Superphosphate, $\frac{1}{2}$ cwt. ..	3.4	13 7	3 3	10 4
Superphosphate, 1 cwt. ..	3.45	13 9	6 6	7 3
Superphosphate, $1\frac{1}{2}$ cwt. ..	5.55	22 2	9 9	12 5
Superphosphate, 2 cwt. ..	5.45	21 9	13 0	8 9

An area of fallow sown to Sudan grass was not a success. Wimmera Rye Grass made prolific growth, and yielded 20 bushels per acre.

A trial was also made of Mr. Reichelt's patent drill, which sows wheat in rows spaced at half the usual distance. The test was in favour of the patent drill by 2 bushels to the acre.

New Wheats for the Mallee.

Twelve years ago, the Government threw open a large area of new Mallee land in the vicinity of Ouyen and along the new railway line from Ouyen to Murrayville. The land was previously regarded as an uninhabitable arid waste; but, as a result of the settlement, a prosperous wheat-growing community has established itself. Some 450,000 acres are now sown to wheat, which, in 1920, was valued at £2,000,000 sterling.

The climate in the locality was drier than in any hitherto settled in this State as a dry-farming area, and with a view to providing special wheats for the district the Agricultural Department instituted a set of experimental plots at Cowangie and one at Carwarp. The results for the season 1921 are now to hand. They show that three of the new Departmental crossbreds have given excellent results as compared with the types usually grown.

The experiments at Cowangie are conducted on the farm of Mr. H. F. Hecht, and at Carwarp on the farm of Mr. P. G. Stewart, M.H.R.

Those at Cowangie were sown on fallow, and those at Carwarp on stubble land. Owing to the hot winds experienced early in November,

the grain was somewhat pinched, and consequently yields, though good for the district, are less than were expected.

RESULTS, 1921.—AVERAGE YIELDS OF WHEAT AT COWANGIE AND CARWARP.

Sown with 45 lbs. seed and 60 lbs. superphosphate, on plots each 1 acre in size.

New Crossbred, Indian E x Telfords	16·5 bushels per acre.
New Crossbred, Indian F x Federation	16·0 " "
Canberra	14·9 " "
New Crossbred "Gallipoli"	14·5 " "
Federation	14·0 " "
New Selection "Wannon"	12·1 " "
Penny	11·9 " "
Dart's Imperial	11·9 " "
Mac's White	11·7 " "

Algerian oats sown on fallow at Cowangie yielded 46·2 bushels per acre.

AUSTRALASIAN BUTTER QUALITY.

Commenting on the quality of recent arrivals of Australian and New Zealand butter on the San Francisco market, the *Pacific Review* says:—

"Butter-makers and creamery men, and we might also include dairymen, who get a chance to examine some of the butter that is arriving from Australia and New Zealand should not overlook the opportunity. We might as well admit it, our Antipodean brothers have it on us when it comes to quality and uniformity of product. When butter can make the long 8,000-mile trip, which requires 30 days in a steamer refrigerator, and arrive in the excellent condition that this butter is in, we are prone to wonder what it was like before it started on the journey. It also calls to our mind the fact that some years ago, as a result of drought in Australia, California shipped some butter down there, the quality of the most of which was a great disappointment when it arrived. The fact is that at least 25 per cent. of the butter made in this country in one week after it leaves the churn is not up to the butter from New Zealand and Australia after it arrives in this country. "How do they do it?" That is the question we asked in these columns several weeks ago. It seems to us it is high time we sent some of our butter-makers and teachers of butter-makers down there to find out. Our leaders in dairy education have laboured under the idea that their education is not complete without a trip to the dairy countries of Europe. They should include New Zealand and Australia, for those countries evidently know how.

TOBACCO FOR VICTORIANS.

(Continued from page 107.)

By Max Valentine, Field Officer.

Flue-curing Bright Tobacco.

It is impossible to specify a fixed schedule of times and temperatures which will successfully flue-cure all barns of Bright tobacco, inasmuch as varying climatic conditions and differences in the State of the tobacco of each barn will have to be considered; but there are fundamental principles, applicable to all varieties, which must be remembered. Each barn-full of leaf must be treated individually, therefore everything will depend on the judgment of the curer, who will need to be constantly on duty during the whole operation.

The thermometer, which is hung in the centre of the lowest tier, must be used only as a guide, more attention being paid to the changing condition of the leaves and to the humidity of the atmosphere in the barn than to the actual number of degrees of heat registered. The expert curer scarcely needs a thermometer at all, as he is able, through long practice, to realize the exact temperature or amount of ventilation which is required at any period immediately upon entering a barn and glancing over the contents. His decisions regarding the necessary heat, &c., are governed by the condition, at the time, of the bulk of the tobacco visible, it being unwise to risk spoiling the majority of the leaves for the sake of a few which may, and generally will, cure slower or quicker than the rest.

The curing process may be roughly divided into four periods, *i.e.*, the period in which, firstly, the leaves "yellow" or "colour"; secondly, when the colour is "fixed"; thirdly, when the mid-rib is dried out; and, fourthly, when the main stalk of the plant is also dried out.

The first period takes place while the plant is yet living, but is slowly approaching death from starvation, owing to the food and moisture supply being cut off. During this period it is necessary to preserve the life (cell activity) and some of the moisture, because as soon as the leaf is dead, or dry, very little change of colour takes place. In order to do this, all the ventilators of the barn must be closed tightly, and there must be just sufficient heat to keep the leaf soft and warm. A humid atmosphere is the required result. The temperature should range from 80 deg. F., at the start, to 110 deg. F. when the process is nearing completion. The temperature must not be raised more than 2 deg. an hour at any time. The length of this period will normally vary from 36 to 48 hours, except in the case of extra heavy tobacco, or that cut rather green, which may take three, or even four, days to obtain the desired colour.

Tobacco is sufficiently "yellowed" when the leaf is a bright lemon colour, streaked with green along the mid-ribs and veins. If "yellowed" too much, the leaf will become reddish and darker when dried and bulked down. Some of the riper leaves will "yellow" quicker than the others, and will begin to "sweat," or give off moisture, which must be evaporated before it can lodge on the face of the leaf.

Where excessive moisture remains for any length of time on a leaf, discolouration, known as "scalding," will take place. Therefore, as the "yellowing" period progresses, it will be necessary to create a current of dry air through the barn, sufficient to carry off all excessive moisture, by partly opening the ventilators at the top and bottom. This will usually take place when the temperature is about 110 deg., and when some of the leaves have begun to curl up at the tips. When the bulk of the tobacco is "yellowed," the temperature should be raised at the rate of $2\frac{1}{2}$ deg. an hour to approximately 125 deg., and it must be held there until the curer is satisfied that all the leaves are of the desired colour.

As the second period is being approached, it will be found that, with a temperature of 120 degrees, some leaves have already dried out, while others are still soft and pliable. The colour will not be "fixed" until the leaf is so dry that it will crumble to pieces if squeezed in the hand. The temperature must be steadily increased to about 135 degrees, and held there until the leaves are in this state.

The mid-ribs may yet be quite soft, and so the third period will be necessary to kill them out. The temperature should be increased as before at the approximate rate of $2\frac{1}{2}$ degrees an hour up to 145 degrees or 150 degrees, and kept steady until each mid-rib is dry and brittle so that it would snap off if twisted back against the main stalk. During this period, the ventilators at the bottom of the barn can be closed, and that at the top partly closed, in order to economize fuel.

For the fourth period, the temperature is rapidly raised at 5 degrees an hour to 175 degrees, and held there until every main stalk is thoroughly dried out. An even higher temperature can safely be used if it be desired to hurry the process, in the event of the barn being wanted at once for a further lot of tobacco; but it is not advisable to go beyond 195 degrees. Before extinguishing the furnace fires and cooling off the barn preparatory to removing the tobacco, the curer must satisfy himself that every stalk is quite dead, as the presence of a few green stalks in a bulk of cured leaf may cause leaves near it to sweat and mildew.

It will be found that, to cure a barn of tobacco by the method here explained, anything from four and a half to seven days will be required, and the wise grower will take the precaution of providing sufficient barns to cure his crop without having to hurry the operation. Tobacco is more often imperfectly cured by hurrying through the process, particularly the "yellowing" period, than by running slightly on the slow side.

If the foregoing remarks are kept clearly in mind, the following table of approximate temperatures may be used as a rough guide for

the flue-curing of a normal crop of Bright tobacco under normal climatic conditions (warm, dry weather):—

- 1st period.—“Yellowing.”—Time, 36 to 48 hours. Close all ventilators. Start temperature at 80 degrees F., increasing after 24 hours at the rate of 2 degrees an hour to 105 degrees. If leaf now begins to sweat excessively, partly open vents top and bottom. Hold at 110 degrees till tips of leaves begin to curl; then increase temperature at rate of $2\frac{1}{2}$ degrees an hour to 120 degrees. Hold till desired colour is reached.
- 2nd period.—“Fixing the Colour.”—Ventilate freely, and raise temperature $2\frac{1}{2}$ degrees an hour to 135 degrees. Hold till leaf is dry.
- 3rd period.—“Drying the Mid-rib.”—Close bottom vents, and partly close top vent. Raise temperature $2\frac{1}{2}$ degrees an hour to 145 degrees. Hold till mid-ribs are dried.
- 4th period.—“Drying the Stalk.”—Raise temperature 5 degrees an hour to 175 degrees. Hold till all stalks are thoroughly killed.

THE PRESERVATION OF FRUIT JUICES.

To a request for information regarding the preservation of fruit juices, Miss Knight, Fruit Preserving Expert, replies as follows:—

Sound fruit only should be selected. Strain the juice into clear sterilized bottles to within, say, an inch and a half of the top; this space is necessary for the expansion of the liquid when heated.

Heating or pasteurizing is best done in a double boiler. If desired, the household washing copper may be conveniently used. It should be fitted with a wooden frame or stool to prevent the bottles from coming into direct contact with the bottom of the vessel. (A full description of these frames is given in the Bulletin on Bottling and Drying of Fruit, which will be supplied free on application.)

The filled containers may be stood on the frame, and the copper or boiler filled with water to within one inch of the top of bottles. Heat the water gradually, and allow it to simmer for about 30 minutes (according to the size of containers). If a thermometer is used, heat the juice (inside the bottles) to from 140 deg. Fahr. to 150 deg. Fahr., and retain that temperature for from 30 to 40 minutes, then cork and seal, cool off, and store.

To cork the bottles. Good, deep, new, sound corks should be used. They should be first steeped in boiling water for 20 minutes or so. These are forced into the necks of the bottles so that they fit very tightly. They are then cut off level, and the tops of bottles and corks covered by dipping them into melted paraffin or other seal.

If preferred, fruit juices may be preserved without heating by the addition of any one of various preservatives prepared according to “regulations and standards for foods and drugs.” Preservatives, either liquid or powders, are procurable from several city firms.

WEEDS AND THEIR ERADICATION.

(Continued from page 169.)

By H. W. Davey, F.E.S., Orchard Supervision Branch, Department of Agriculture.

The Red Ink Plant, *Phytolacca octandra*, L., Phytolaccaceæ.

This handsome plant delights in a good soil, and given this and plenty of moisture, grows into a very large, spreading bush.

The Red Ink plant derives its name from the very brilliant colour of the juice, similar in appearance to the bright scarlet of red ink, contained in its numerous black fruits.



Fig. 28.—Flowering Stem of Red Ink Plant.

It is a perennial, and is said to be a native of Mexico. It can easily be identified by its spikes of insignificant whitish flowers, tinged with green (Fig. 28), the red colour of most of its stems, and later, when in fruit, by the numerous black berries (Fig. 29) which are shown on the spray on the right-hand side of the illustration; the spray on the left is carrying both flowers and fruit.

Young specimens can be hand-pulled, but with old-established plants, this is impossible. These large bushes should first have their tops killed by an arsenical spray, after which the roots should be dug out.



Fig. 29. Fruit of Red Ink Plant.

Spray with both fruit and flowers.

Another method is to cut them off below the surface of the ground and apply a liberal dressing of dry salt to the cut surface of roots.

This plant is proclaimed under the Victorian Thistle Act for the shires of Melton, Werribee, Bacchus Marsh, and Ballan.

The Prickly Lettuce,

Lactuca scariola, L., Compositæ.

This genus contains the common lettuce so largely grown for salad purposes.

The Prickly Lettuce is a useless species, indigenous to England, and, in all probability, was introduced into Victoria with impure seed.

As can be seen in Fig. 30, it has nearly perpendicular leaves, of a stiff, hard nature, and wavy edges. The leaves grow alternate on the stem, and are sessile, clasping the stem with an ear-shaped lobe or auricle (Fig. 31). The underside of midrib of leaves usually has numerous prickles on it.

The flower stem (Fig. 32) ranges from 1 foot to 5 or 6 feet in height or even more, and has numerous heads of bloom, of a pale yellow colour, producing an enormous number of seeds, which, when ripe, are borne away with every puff of wind.

The prickly nature of the stem is shown in Fig. 33.

The plant is an annual, and, like many other annuals, is very troublesome and difficult to deal with once it has been allowed to seed freely.

In "The Weeds of New South Wales," by J. H. Maiden, the following reference to this plant is of interest:—

"A whole countryside can be sown by one gust of wind from a few plants; hence it is difficult of control by man. If a man's land were free of it to-day, he cannot tell whether it will be not sown with it to-morrow."

The Farmers' Bulletin 28, Department of Agriculture, United States of America, quoted by the same authority, says of this plant:—

"A most pernicious weed; a single average plant has been found to bear more than 8,000 seeds."

It is not yet proclaimed under the Victorian Thistle Act, but from the



Fig. 30.—Prickly Lettuce.



Fig. 31.—Leaves of Prickly Lettuce showing prickles.

Fig. 32.—Portion of flower stem of Prickly Lettuce.

Fig. 33.—Portion of stem of Prickly Lettuce showing its prickly nature.



Fig. 34.—*Amaranthus retroflexus*.



Fig. 35.—Portion of flower stem of
Amaranthus retroflexus.

way in which it is establishing itself in some parts of the State, it probably will be in the near future.

Prickly Lettuce is not easily hand-pulled when found growing in hard ground; it usually breaks off a few inches above the surface, allowing the plant to throw up a fresh flower stem.

Unlike most annuals, it is often troublesome on grass lands, and the writer recently found the stumps of this plant growing fresh flower stems in a lucerne paddock that had just been cut for hay.

When the lettuce plants are young, both sheep and cattle should be useful for the purpose of feeding them off; but, when older, they become very bitter and woody, and would then most likely be rejected by stock. Even if cattle would eat the older plants, the bitterness of the leaves would probably badly taint the milk of dairy cows.

In cultivated land the plants should be either hand-pulled or hoed out, and on no account allowed to run to seed. Usually, by the end of February, the seeds have matured, and been carried away by wind—many of them to other localities.

For controlling such a plant as this, co-operative destruction in the whole district, on roadsides, railway banks, and waste lands is necessary before the flowers reach the seeding stage.

It is for weeds such as this that the provisions of the Thistle Act should be strictly enforced against the land-owner who is careless concerning both his own and his neighbour's welfare. During the summer, even the least observant will see wind-borne seeds such as those of the Prickly Lettuce being carried in every direction. There are weed nurseries, in some instances, on vacant allotments in country towns, where the destruction of the plants would involve the owners in very trifling trouble or expense. Even if total eradication of weeds on these allotments was not insisted upon, it should, at the very least, be made compulsory to keep weeds from maturing seed which later on may infest a whole countryside.

Amaranthus retroflexus, L., Amaranthaceæ.

This common weed, which is an annual, appears to follow cultivated ground, and is often introduced by means of impure seed. It is a great nuisance when growing among vegetables, robbing the soil of its moisture as well as shading the crop.

Where cultivation is practicable, it may be easily destroyed, but elsewhere it is difficult to exterminate, owing to its being such a heavy seeder and the great vitality of the seed, which it is said will remain viable after being buried in the soil for thirty years, or even longer. Great care should be taken, therefore, to prevent the seed from ripening, and all plants in flower or seed should be gathered up and burnt.

Fig. 34 shows a small specimen which was hand-pulled, and Fig. 35 is a portion of a flowering stem.

(To be continued.)

THE CULTIVATION OF HOPS.

(*Humulus lupulus*.)

By Temple A. J. Smith, Tobacco Expert.

Though the growing of hops for profit has been an industry for many years in Victoria, it has not, up to the present, reached much prominence, and has suffered many fluctuations, but now appears to be making some headway.

In the past, the quality of the Victorian hops was considered inferior, but the adoption of better systems of growing and curing, together with the use of new varieties suited to soils and climate, have so improved the quality that they are now considered equal to, if not superior to, the Tasmanian.

In 1883-84, 1,758 acres were under cultivation, yielding 15,717 cwt. This was the maximum production in any one year for this State. After this, for various reasons, principally low prices, the area dropped to 71 acres, with a yield of 522 cwt. in 1918-19; since which year the area has been gradually increasing, and some fine returns have been taken.

The Counties of Delatite, Bogong, Dargo, Polwarth, and Buln Buln, are those in which hops are grown, by far the greater part, however, being in Delatite and Bogong.

Soils.

Hops thrive best in rich, alluvial river or creek flats of fair depth, with good natural drainage, where irrigation can be used, and in climates not liable to drought or late frosts, and where strong winds are not common.

Deep cultivation is necessary in order to allow the roots easy penetration, and subsoiling to a depth of 2 to 3 feet is advisable.

Propagation.

Propagation is accomplished from seed or cuttings, the latter being called sets, the usual practice followed in establishing a hop plantation being to secure sets from an old and successful garden. Failing this course, the seed can be sown, and sets taken from the roots the next year and planted in September. The sets or cuttings are planted in hills 7 to 10 feet apart, and strikes up to 98 per cent. are general, the wider rows generally producing better quality but a lesser quantity.

Trellising.

Systems of training vary, and the old fashion of placing three poles to each hill is now being abandoned for the better system of trellising on permanent poles, on which wires are stretched from end to end of the plantation, and strings taken from each hill and attached to the wires on the poles. These poles average about 6 to 8 inches in diameter, and 10 feet in height. They should be deeply placed in the ground, and strongly braced to sustain the weight they will be required to carry.

The cost of erecting trelliswork is estimated at from £40 to £60 per acre. Room for turning with the plough and cultivator should be left at the ends of the plantation, from 18 to 20 feet being required.

Manuring.

Fertilizers and manures are freely used in quantities of half a ton of bonedust to the acre; and farm manure, when obtainable, 30 loads per acre.

Training the Vines.

The first year the young hop is trained up a single string, but in subsequent years, three strings to each plant are used. The yield from a first-year crop is from 5 cwt. to half a ton per acre, and later, when the hop is well established, 1 ton per acre is considered a good crop.



A hundred-acre Hop Plantation.

Cultivation between the vines should be thorough in order to keep the soil loose and prevent weed growth. The shoots must be trained, and in some cases tied up to the strings. Water should be put on artificially when required.

Harvesting.

Harvesting takes place in February and March, and many hands are required at this period. The stage of ripeness is indicated by the colour of the cones changing from green to yellow, and the tips closing and rustling when touched. The method of picking is to cut the vines and pick the cones into specially made bins about 6 feet by 2 ft. 6 in., and 2 feet in depth, from which receptacle they are taken in bags and weighed before putting in the drying kiln. The picking is almost always done by hand, and paid for on results, a good picker earning up to 10s. per day. An average picker will pick approximately 125 lbs. in a day. The price for 100 lbs. is 6s.



Mr. Panluk's Hop Plantation at Eurobin.

Drying.

The kilns in which the hops are dried are of varying sizes. The usual building is 20 feet square, and 16 feet to the eave. The furnaces are on the ground floor, and another floor is built from 10 to 12 feet from the ground, of battens 1 inch apart, and covered with wire gauze and hessian; on this floor, the hops are spread as taken from the field

to a depth of 1 foot deep, and turned as required with a large wooden shovel or scoop. Curing takes from eight to ten hours, at temperatures ranging from 105 degrees F. to 120 degrees F., and in some cases still higher, the object being to dry out the moisture without spoiling the colour or scorching the hops. The use of ventilators or air fans is required for this purpose. Charcoal is considered the correct fuel, but furnaces are now often made which consume wood. Care must be taken to avoid smoke passing through the hops. After drying, the hops are raked out on to floors well off the ground, generally a loft, from which they can be passed into the press.

Presses are made on the principle of the wool press, and the hops are placed in wool bales, each bale holding from $1\frac{1}{2}$ to 3 cwt., when the crop is ready for market.

Prizes, &c.

Prices during recent years have proved highly remunerative to growers, ranging up to 5s. per lb., giving a return of £500 per acre. These prices may not be maintained, but there is still a handsome profit to be made at lower prices. The cost of establishing a hop garden depends greatly on the facilities for obtaining poles, &c., but can be put down at from £75 to £100 per acre; and the annual attention and cost per acre, from pruning to market, at £50 per acre. The variety giving most satisfaction at present is that known as the Cluster Hop.

Conclusion.

The valley of the Ovens River, in the north-eastern portion of Victoria, is now growing the bulk of the hops produced, one plantation of Mr. Panluk, of Eurobin, consisting of 100 acres; while Mr. Gow, of Harrierville, and Mr. O'Sullivan, of Ovens Vale, also have large gardens, and are highly successful growers.

In conclusion, I would suggest that any intending grower would profit greatly by a visit to some well-established garden before laying out his own, in order to see the general conditions and practices under which present hop producers conduct their operations.

FEEDING DAIRY COWS.

By A. J. Gill, Dairy Supervisor.

In some portions of Australia, nature has apparently made provision for drought and times of scarcity by providing trees and shrubs with edible foliage on which stock may subsist. Victoria, however, has not been so favoured, and has no source on which animals may draw during times of stress.

Judging from past experiences, portions of Victoria are visited by droughts every few years, and during each visitation large numbers of valuable animals are lost, as each dry spell finds the majority of farmers, notwithstanding repeated warnings, unprepared and their farms overstocked. I have noticed throughout the State the strong tendency on the part of land-holders to keep on increasing the size of their flocks and herds without making any extra provision for them.

Some time since, I occasionally visited a farmer on a small piece of land of extra good quality, but so overstocked that the cattle were

always in low condition. I kept continually pointing out to him the difference in the yield between cows well fed and those partially starved, and advised him to reduce the size of his herd. He said he would try to rent another 6 acres. Subsequently, I visited his farm, and learned that he had been successful in obtaining the extra 6 acres; but he had also purchased six more cows. Needless to say, his herd was in the same starved condition as before.

When a drought comes, it is on the dairyman with cows in calf and in low condition that the severest strain falls. In fact, it is usual for some to be so heavily stocked as to lose one or two cows each year. If the winter be mild, they may struggle through, but with their herds in poor condition. Such cows will probably have a fair milk supply for a few months during the spring and early summer, but when the green grass disappears, the cows will dry off. During a severe winter, it is the poorest cows that are lost, and as these are naturally the heaviest milkers, the herd is culled in a most unfortunate manner. It is only when a man gives his cows sufficient feed that he can cull satisfactorily.

I know of a farm where the cows were giving about $2\frac{1}{2}$ gallons per head when the owner commenced to increase their feed, and then the yield from each member increased; but one cow soon shot ahead of her mates, until she was giving 50 lbs. of milk daily. A cow yielding 200 lbs. of butter-fat on one farm may yield 450 lbs. on another where she is properly fed.

Most land-holders, of course, do not like to see any grass going to waste, but, after all, it is much better to have a little surplus grass in the paddock than to have stock dying in the winter time. Further, a little old grass will shelter the young grass from severe frosts, and secure a much better growth during the winter time.

It is exceedingly disappointing to find men who have purchased pure-bred bulls, and, in some cases, are testing their cows and keeping records, yet keeping their herd in a semi-starved condition. Testing, in these circumstances, is not of much use. If a man wishes to be successful on the land, he must feed his stock. In nineteen cases out of twenty, one can judge a man's banking account by the condition of his stock.

It must also be remembered that feeding a cow well one year will cause a natural increase the year following, by developing the udder and blood vessels. Development can never take place unless a cow is well fed.

There appears to be no reason why every dairyman in Victoria should not be able to have sufficient food always on hand for his stock. In a number of cases, by reducing his herd of cows by one-third, and giving the quantity of food formerly used to the smaller number, the farmer would find a substantial increase in his banking account at the end of the year, and, further, he would not lose two or three valuable cows every hard winter.

In all dairying parts of Victoria good fodder crops, such as lucerne, oats, millet, and maize can be grown. Though a number of farmers do grow such crops to supplement the pasture, the area is often too small to be of much use. For instance, $1\frac{1}{2}$ to 2 acres of maize or millet, and a couple of acres of oats, will not go far towards feeding a herd of 40 cows. It is a wise rule to cultivate at least 1 acre for each cow.

In growing the crops, a scheme which I found to work very well was to have two cultivation paddocks, and use them for summer and winter crops alternately. A great advantage was that the ground used for maize and early potatoes was worked well through the summer, and retained a certain amount of moisture, and consequently was in good condition for early green-stuff and the oaten crops. The ground from which the grain crops had been cut was ploughed in the early winter, the moisture conserved, and an early crop of millet or maize insured. The working of the ground each year at a different time kept down weeds and helped to keep it in good condition.

In storing the crops the circular silo stands out for handiness for either ensilage or chaff. A good supply of ensilage provides succulent roughage for all seasons of the year.

When harvesting the hay crop, an effort should always be made to chaff the hay direct from the paddock into the barn or silo. This saves the expense of double handling and the purchasing of chaff bags, and prevents loss both from mice and weather.

When feeding dairy cows, in order to get the very highest value from pastures, it is necessary to supplement roughage, *i.e.*, bulk food, with concentrates, or, in other words, to balance the ration. Unfortunately, many of our dairy farmers think that the balancing of a ration is something that is altogether too difficult for them to consider or to attempt. To these the following simple hints may be of use.

The chief necessary constituents of food are protein, carbohydrates, fat, and certain mineral matters. Protein, one of the chief constituents of lean flesh, milk, skin, and hair, is the most valuable and the most difficult to obtain. In order that an animal may be given sufficient protein, grain mixtures, bran, pollard, linseed meal, &c., are used.

Carbohydrates supply the heat and energy for the body, and are supplied by sugars, starches, crude fibre. These are usually supplied in liberal quantities by the roughage given to cows, and are therefore much easier to obtain than protein. Fats are used for the same purposes as carbohydrates. Mineral matter such as potash and lime are supplied by lucerne, clovers, and other legumes, and phosphoric acid by bran. The farmer's chief concern, therefore, is to supply concentrates containing sufficient protein. To do this it is necessary to study the quality of the roughage. For instance, when the grasses are flowering and seeding, they contain a much higher percentage of protein than after they have become bleached in the sun and the seed has fallen. Thus, the quality of the pasture varies during the year. Again, the protein content of lucerne is much higher than that of maize and millet. The protein of different grains also varies; consequently, a mixture of these is more palatable, and gives the best results. As concentrates in light, bulky form, such as bran and ground oats, are the more easily digested, an endeavour should be made to have half, and never less than one-third of the mixture in this form. Bran and linseed meal have laxative effects. In order to arrive at the amount of concentrates to allow, the following may be taken as a rough guide:—

For Friesian—1 lb. of concentrates to $4\frac{1}{2}$ to 5 lbs. of milk.

For Ayrshire—1 lb. of concentrates to 4 to $4\frac{1}{2}$ lbs. of milk.

For Jersey—1 lb. of concentrates to 3 to $3\frac{1}{2}$ lbs. of milk.

At times, breeders feed 1 lb. of concentrates daily to every 1 lb. of butter fat produced weekly.

Some cows respond better to one mixture than another. The farmer should, therefore, vary the constituents of each cow's feed and note if this has any effect on her yield. He should also observe the result of increasing the quantity of any cow's allowance.

An allowance of salt will make the food more tasty and help to keep the cow in good health. An ounce or so might be given with the morning ration and the same quantity again in the evening.

Where the cow has good pasture there is very little need for roughage in the bails—2 or 3 lbs. daily to insure slow mastication of the concentrates is sufficient.

The following is a list of 10-lb. mixtures of concentrates which have been and are being used by several of the successful breeders in the Government Herd Test. The percentage of protein in each mixture is stated.

3 lbs. bran	}	10.8 per cent. protein.
3 lbs. ground oats		
2 lbs. ground barley		
2 lbs. polly meal		
3 lbs. bran	}	12.3 per cent. protein.
3 lbs. branning		
2 lbs. coconut oil cake		
2 lbs. polly meal		
3 lbs. bran	}	13.2 per cent. protein.
3 lbs. ground oats		
3 lbs. malt combings		
1 lb. Meggitt's meal		
4 lbs. ground oats	}	13.4 per cent. protein.
4 lbs. bran		
2 lbs. Meggitt's meal		
4 lbs. bran	}	15 per cent. protein.
3 lbs. polly meal		
2 lbs. maize oil meal		
1 lb. Meggitt's meal		
4 lbs. bran	}	15 per cent. protein.
2 lbs. pollard		
2 lbs. polly meal		
2 lbs. linseed meal		
4 lbs. bran	}	15.3 per cent. protein.
2 lbs. ground oats		
2 lbs. maize oil meal		
2 lbs. Meggitt's meal		
5 lbs. bran	}	16.4 per cent. protein.
3 lbs. maize oil meal		
2 lbs. Meggitt's meal		
3 lbs. bran	}	16.7 per cent. protein.
3 lbs. polly meal		
2 lbs. pea meal		
2 lbs. Meggitt's meal		

WORLD'S POULTRY CONGRESS.

By A. V. D. Rintoul, N.D.D., Chief Poultry Expert.

(Continued from page 181.)

POULTRY KEEPING IN SOUTH AMERICA.

' The New South American Fowl.

Professor Salvador Castello Carreras gave an interesting description of a new breed of fowl which he had discovered in Chili in 1914. The shanks and beak are either yellow or white; eyes, dark red; comb, small; tail always absent. Lays rather a small egg, of bluish colour, or blue with small brown spots.

It is more plentiful in the south of Chili than in Arancaria, but is found again towards the north, even in the latitude of the Panama Canal.

Professor S. C. Carreras has lectured on poultry keeping throughout the Argentine, Uruguay, and Chili. In Mexico exists a poultry school aided by the Federal Government, and the National Association publishes a well informed paper. Exhibitions are held, and modern poultry raising improvements are well known.

In Uruguay the Government awards scholarships to students who have studied poultry keeping in the United States, and in Europe. It also runs a model poultry farm, where 2,000 birds are reared every year, and thousands of eggs are sold at very low prices to enable the farmers to get hold of excellent strains of birds on advantageous conditions. The Government of Uruguay, in 1917-18, ran a twelve months laying test, when the average production for the competition was 185 eggs per bird.

From 400 to 500 persons attended Professor Carreras' lectures, which showed the public interest in the poultry industry.

In the Argentine Republic, particularly in the province of Buenos Ayres, poultry breeding is enthusiastically undertaken. The Government has founded a poultry school in La Plata, and various lecturers travel all over the country to encourage poultry keeping.

As regards production, Mexico and Uruguay produce sufficient for home consumption, but Argentina still imports a great many which are provided by Uruguay, Chili, and even Australia.

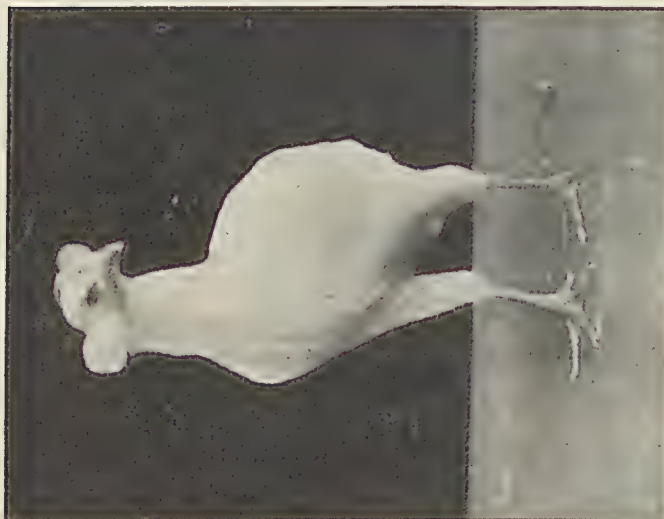
Six hundred and fourteen students, including 120 ladies, underwent a course of poultry keeping at the University of Santiago, in 1914.

Crossing the Straits of Magellan to Punta Arenas, in Patagonia, there may be found one farm carrying 12,000 birds, whose eggs are sold to the ships passing through the Straits. An American naval squadron on one occasion took 40,000 dozen eggs from this farm, all laid by the rumpless fowls.

Amongst these hens are some with two tufts of feathers, one on each side of the head, which always bears a single comb. These tufts originate in a small epidermic protuberance which, in its turn, is connected with the head by a fine thread of elastic skin, which allows the protuberances to be stretched to a certain length from the head.



Cock.



Hen.

A new South American Fowl.
(Specimens five or six months old.)

There are no feathers on the shanks. The feet, like the beak, are white or yellow; the latter colour is the more frequent. The colour of the feathers, though generally white, or white with red wings, is extremely varied. As will be seen from the illustrations (p. 240), this is undoubtedly a new type, and is now known as *Gallas inauris* (earrings).

Organization of Experimental and Extension Work in United States of America.

Mr. H. M. Lemon, Senior Poultry Expert, Department of Agriculture, United States of America, described the progress of the work of his department. In 1906, the first poultry bulletin was issued, and in that year the first appointment to a regular poultry position was made.

Two years later, a general survey of poultry and egg conditions was made in the middle Western States, and "rooster" days were held in many States, when whole car loads of male birds were shipped to market. [This idea might be well applied to Victoria.]

The year 1912 saw the start of the Government Poultry Farm, since which time the development has been consistent, and is now being extended more towards the research side, although the great extension bureau, known as the States Relations Service, is continuing and expanding.

Twelve bulletins have been issued specially for boys' and girls' clubs, and 22 other bulletins are available for farmers. The poultry industry is worth about 1,000,000,000 dollars a year to the United States of America, and extension and research work are considered an investment, not an expense.

About 2,000 birds are kept for experimental purposes on the Government Farm. An interesting experiment conducted on the Government Farm was the mating up of farmers' mongrel fowls, bought in the auction rooms, with pure bred male birds.

In the course of three generations, the progeny showed an average increase in weight of 2.16 lbs. per pullet, and a "Better Sires" campaign was promptly launched.

Another experiment on the value of meat meal proved that where pullets on range averaged 90 eggs per bird, their returns could be raised to 150 eggs per bird—another five dozen eggs—by the use of about sixpence worth of meat meal per bird.

Somewhere about 15,000,000 dollars worth of eggs are spoiled annually through being fertile, which is an excellent reason for the elimination of the surplus rooster.

American Methods of Lighting.

Professor H. R. Lewis, of New Jersey, gave an interesting description of artificial lighting, and the associated feeding problems, which were unknown up to twenty years ago, when Dr. E. C. Waldorf first experimented, and it was really only ten years ago when Dr. and Mrs. Shoup, at Puyallup, Washington, attempted to work on a commercial basis.

By the use of some means of artificial lighting, laying flocks are given additional hours of light in which to eat mash and grain. It is estimated that artificial illumination increases egg production by about two dozen eggs per bird, and also increases the net return per bird by two dollars a year, owing to the increased production during the winter months, when prices are high.

Six hundred unlighted pullets showed a profit of \$4.10 per bird; 500 pullets lighted 4 a.m. to dawn, \$5.77 per bird; 100 pullets, lighted for night feed, \$6.48 per bird, the cost of the current being about $4\frac{1}{2}$ cents per bird, which means that an increase of one egg pays for the current.

Experiments proved that best results were obtained on a day of fourteen hours light, and ten hours darkness. Two 25-Watt lights were used in a house 20 feet by 20 feet, but where electricity is not available, ordinary barn (or hurricane) lanterns have been used successfully, whilst gasoline, acetylene, and other methods, are at times used.

Tests showed that birds re-acted favorably to lights in from seven to ten days. The lighting is primarily a feeding problem, and really advances the season of heavy production from the spring months (when the days are lengthening) to the naturally shorter days of autumn and winter.

Equipment for Hatching and Rearing Chickens.

Mr. G. Cugley, president of the American Incubator Manufacturers Association, explained that the object of this association would be to promote, co-operate, co-ordinate, and foster the incubator manufacturing business, including brooders, supplies, equipment, and allied lines, and that all the members of the association must have the following qualifications.

First: Members must be well qualified to conduct the business in which they are engaged.

Second: Members must have sufficient capital, and facilities for the proper conduct of their business.

Third: Members must be of good moral standing, and enjoy a generally good reputation.

Fourth: Members must agree to abide by the rules and regulations governing this association.

Fifth: Members must, regardless of anything else, be actively engaged in the manufacture of incubators or brooders for at least three years.

For a long time the best known American incubators were heated by hot air systems, which mostly cooked all the moisture out of the circulating air before it entered the egg chamber, and pans of water or wet sand were used in an effort to replace that necessary moisture. The substitution of hot water radiating systems, however, developed the fact that fresh eggs would hatch satisfactorily without artificial moisture, and 90 per cent. of the machines now made in America are on this system.

The most important factor in the production of strong, healthy chicks is the maintenance of a uniform temperature from the time they leave the shell till they leave the incubator, according to Mr. Cugley, who also considers that white diarrhoea of chicks is frequently attributable to a sudden change of temperature during the first twenty-four hours after hatching.

Possibilities of Manufactured Poultry Feed.

Professor M. E. Dickson, of Michigan Agricultural College dealt with this particular subject, recommending the ready mixed mashes and mixed grains, on the grounds that the firm who did the mixing did so with some knowledge of the chemistry of foodstuffs, and took care that the rations were well balanced. Modern machinery, and dealing in large quantities would help to keep down the cost, and thereby enable

the manufacturer to put out a mash, or scratch grain, on terms that would compare favorably with the cost entailed by the poultry farmer by mixing up his own foodstuffs.

Principles of American Culling Practice.

Dr. O. B. Kent, of Cornell University, pointed out that the characters used in culling to determine length of laying period were:— (1) Body conditions, indicating laying; (2) pigmentation; (3) moulting.

Careful measurements showed that the parts of the body vary with the laying condition. The comb increases or decreases in size according as the hen is increasing or decreasing her production. When laying uniformly or decreasing, the comb feels cold to the touch, but as her weekly number of eggs increases, the comb feels warm. With a laying fowl, comb expansion is accompanied by an expansion of the vent, which becomes loose, moist, and flabby; the abdomen also becomes soft and pliable. Comb expansion on a hen that is not laying produces a small hard, dry, tight, puckered vent, and small, hard, leathery abdomen.

Pigmentation only applies to yellow skinned varieties, which are largely kept in America. The colour fades first in the vent, then in the eyes, comb, face, and ear lobes. After that the beak fades, and lastly the shanks, the scales in front fading first, these on the heel of the shank last. When a hen stops laying, the colour returns in the same order as it went out. Maize products and green stuff assist in the retention of the yellow colour. The severity of the culling depends on the feed. If the birds were fed heavily on milk, oats, or buckwheat, and had bare ground, or no range, any bird that was at all yellow would be culled, but if the birds were running on a good grass range, and were heavily fed on maize, only the yellowest shanked birds would be removed.

The third factor, moulting, applies to all breeds alike. It has been found in America that, except in comparatively rare cases, a hen does not shed feathers and lay at the same time. Occasionally a particularly good hen may be found capable of shedding a few feathers at a time, and still keep on laying. The wing primary feathers are shed in regular order, the one next to the body first, and the outside one last. It takes approximately six weeks for each wing primary feather to grow, and they are shed out at approximately two week intervals. In America, during July and August (equivalent to January and February in Australia), it is roughly correct to multiply the number of new wing feathers by two, to obtain the length in weeks of the resting period.

The back of a good producing bird is flat and wide, holding its width to the tail. A poor layer is relatively wide at the middle of the back, and narrow at the tail. Dr. Kent stresses the fact also that the good layers generally are less "wild" than the poor layers, and do not object to being handled.

Incubation.

Mr. G. H. Lamson, junior, of Connecticut Agricultural College, detailed research work in incubation. According to Phillips, eggs kept best resting on their sides. Lillie found that eggs, kept at low temperatures, were slower in starting incubation. Dryden found that it was impossible to determine whether the egg is fertile, and that neither size nor shape of egg determine sex.

Cellars are preferred for incubators on the grounds that a more even temperature can thereby be obtained. As regards humidity, testing 10,000 eggs, there was found a fairly wide latitude, the best results being obtained with from 40 per cent. to 60 per cent. humidity. Above 70 per cent., and below 20 per cent. humidity gave poor results. Turning the eggs during incubation had been investigated by Eycleshymer, and it was considered that turning five times a day gave better results than turning twice, which is the more common practice, and is labour-saving.

The individuality of the hen effecting the vitality of the chicken embryo was also carefully dealt with. Certain hens can be found that over 90 per cent. of the eggs they have laid will hatch, whilst others lay eggs that will only give a 30 per cent. hatch. The suggestion was put forward that lethal factors have caused the death of embryos at different stages of their development, and that these factors may be transmitted to the offspring, so that eggs are laid in which embryos will develop that have little chance of surviving the seventh, eighth, or eighteenth day of incubation. "Why chickens die in the shell" may be answered some time by the geneticist—that embryos inherit a weakness, and death is liable to come before hatching. This has been shown in the embryology of rats, and the day can be foretold on which the embryos will die during development. Seventy-five to 80 per cent. of the chicks that die in the shell do so after the eighteenth day, which is mainly due to a lack of strength inherited from the mother. Probably it is just as well that they do not hatch, and thus transmit weakness. A careful study is recommended of pre-incubational conditions of the mothers of future chick embryos.

(To be continued.)

POULTRY FEEDING EXPERIMENT.

A. V. D. Rintoul, N.D.D., Chief Poultry Expert.

W. C. Rugg, Poultry Foreman, Werribee Research Farm.

The following feeding experiment was conducted at the Werribee Research Farm, starting on 1st April, 1921, and concluding on 31st March, 1922. One hundred and twenty pullets were divided into four pens of thirty birds each, as nearly equal in quality, age, and weight as possible. None of the best matings were included, as these were required for either single test pens, or *bonâ fide* settlers.

All four groups were fed wet mash in the morning, and green stuff at mid-day, but each group was fed differently as regards the grain at night, the object of the experiment being to test the economic importance of the various cereals used on flocks of comparatively moderate quality pullets such as would be found on any average farm, and not to establish high records from specially selected birds.

Pen No. 1 was fed Algerian oats (not clipped).

Pen No. 2 was fed wheat.

Pen No. 3 was fed barley.

Pen No. 4 was fed mixed grains (2 wheat, 1 oats, 1 barley).

The wet mash was made up of equal parts by measure—bran, pollard, and green stuff. The bran was moistened with soup made from boiled table scraps, sheep's heads, livers, &c., or else meat meal, and dried off with pollard to a nice crumbly condition when the green stuff was added.

During the months of April, May, and June no bran was available, so ground wheat and ground barley in equal quantities were used in place of bran in the morning mash.

The green stuff used was lucerne, green barley, rye grass, and cuter leaves of vegetables cut fresh and put through the chaff-cutter.

Minced raw onions were fed once a week at the rate of $1\frac{1}{2}$ lbs. per 100 birds. Epsom salts and sulphur were used occasionally.

Housing.

The birds were housed in a corrugated iron shed, divided into four pens, each containing about 160 square feet of floor space, being slightly over 5 square feet of floor space per bird.

The floor was kept covered with litter 4 to 6 inches deep, and no outside run was made available.

A dust bath was provided, whilst shell grit and charcoal were always available. Dropping boards were provided underneath the perches.

Health.

Unfortunately the mortality was high, as 10 died in No. 1 pen, 8 in No. 2 pen, 9 in No. 3 pen, and 6 in No. 4 pen. Sixteen of these died from unknown causes; *post mortems* were held on the farm and one bird was sent to the Veterinary Research Institute, without definite results, although it is more than likely that—indirectly—rats were the cause, by contaminating the drinking water. Early in December a raid was made, and 182 rats were thereby killed. After that no deaths occurred. Heat caused the death of 6 birds on 18th November, 3 were crop-bound, 6 died from ovary troubles, and 2 from accidents.

EGG PRODUCTION.

Month.	No. of birds.	Pen No. 1.	No. of birds.	Pen No. 2.	No. of birds.	Pen No. 3.	No. of birds.	Pen No. 4.	Price of eggs.
									s. d.
April ..	30	199	30	238	30	281	30	260	2 9
May ..	28	222	27	221	27	194	29	187	2 10
June ..	25	343	27	279	25	284	29	230	2 6
July ..	25	396	25	368	24	259	28	363	1 11
August ..	25	478	25	468	24	362	28	464	1 6
September ..	25	535	23	476	23	410	28	512	1 1
October ..	21	450	23	412	23	425	28	557	1 1
November ..	20	254	22	351	21	310	25	398	1 3
December ..	20	333	22	302	21	273	25	336	1 6
January ..	20	327	22	265	21	224	24	376	1 6
February ..	20	228	22	227	21	203	24	308	1 8
March ..	20	188	22	224	21	155	24	235	1 11
		3,953		3,831		3,380		4,226	

ANALYSIS OF FOODSTUFFS USED IN POULTRY FEEDING EXPERIMENTS AT THE RESEARCH FARM, WERRIBEE.

Samples on analysis were found to contain—

—	Barley.	Oats.	Wheat.	Ground wheat and barley.	Mixed. Two of wheat; one of oats; one of barley.	Bran.	Pollard.
	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.
Moisture	11·91	8·89	10·55	10·85	10·11	10·46	10·31
Ash	3·01	3·61	2·81	2·89	2·36	4·82	2·36
Protein	8·25	9·25	10·69	9·38	9·79	13·81	12·06
Fibre	5·39	8·97	2·72	4·11	5·38	8·91	5·03
Nitrogen free extract	69·55	61·84	71·18	70·79	69·03	58·71	66·25
Ether extract ..	1·89	7·44	2·05	1·98	3·33	3·29	3·64

Summary.

EGG YIELD AND FEED COST.

—	Average eggs per bird.	Average price per dozen eggs.	Return per bird.	Cost of Feed.			Profit over feed.
				Mash.	Grain.	Total.	
		s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Pen 1 (Oats) ..	170	1 8	23 7½	3 1½	3 9½	= 6 11	16 8
Pen 2 (Wheat)	150½	1 8	20 10½	2 8½	6 7½	= 9 4½	11 6½
Pen 3 (Barley) ..	144½	1 8½	20 9½	2 7½	3 3½	= 5 10½	14 10½
Pen 4 (Mixed) ..	157½	1 7½	21 1½	2 5½	4 6½	= 7 0½	14 1½

It will be seen from above that the Algerian oat fed pen showed the best score, as well as the greatest profit per bird.

Weights of Birds.

At the commencement of the test the pullets averaged 2 lbs. 12 ozs. each.

At the conclusion of the test the No. 1 pen averaged 3 lbs. 4 4-5 ozs. each; No. 2 pen, 3 lbs. 9½ ozs. each; No. 3 pen, 3 lbs. 10 ozs. each; No. 4 pen, 3 lbs. 8½ ozs. each.

The oat fed pen showed the least gain in weight, and the others were more or less equal, with a fractional margin of increase in favour of the barley pen.

Food Prices.

Wheat, 60 lbs. bushel—1st April to 31st January, 9s. per bushel; 1st February to 31st March, 5s. per bushel.

Oats, 40 lbs. bushel—All the year, 3s. per bushel.

Barley, 50 lbs. bushel—1st April to 31st December, 3s. 6d. per bushel; 1st January to 31st March, 3s. 3d. per bushel.

Bran and pollard—£6 10s. per ton throughout the year.

Crushed wheat, 60 lbs. bushel—April, May, and June, 9s. 4d. per bushel.

Crushed barley, 50 lbs. bushel—April, May, and June, 3s. 10d. per bushel.

No charge was made for greenstuff, or meat scraps.

CONCLUSIONS TO BE DRAWN.

It may reasonably be concluded that Algerian oats are a thoroughly satisfactory feed, and should be more generally used than is the case at present. As was anticipated, barley gave the poorest egg yield, but the birds so fed laid well at the time of the year when eggs were dearest. Barley might, therefore, be fed with advantage during the winter months.

HOW TO GROW NATIVE PLANTS.

It is a mistake to think that our native plants do not like rich soil. They do, but, with very few exceptions, they dislike raw and fresh manure. What the majority of our bush plants do not like is root interference. They should be grown in a place to themselves, not in the mixed borders where once a year at least other plants are being dealt with and the soil renovated. They should be allowed to grow thickly so that there is no room for anything, no room to dig, even if you wanted to. There is no reason why the bright *Lambertiana* should not cuddle itself under and round the stem of a bottle-brush, and if a *Jacksonia* should poke itself out of the top of the same bottle-brush, no harm is done; they love to snuggle up to each other. When you have grown your first line of defence, or a base for others to jump off from, there is a wide range of possibilities. In fact, so much at home could you make your native plants in your native plant garden, that not only the bright flowering gums from Western Australia, but many of our native ferns could be made to grow.

Successful and permanent development is best attained by seedlings grown by yourself. Transplanting from the bush has its merits, but they are limited. Much can be done by purchase, but there is not the same pleasure in growing a plant some one else has raised as the one you can claim as your own.—*Agric. Gazette of New South Wales*, Feb., 1922, p. 140.

RUGGING DAIRY COWS.

By R. T. McKenzie, Senior Dairy Supervisor.

The provision of suitable rugs for cows during the colder months should not be left till winter has actually come. Although the practice of rugging is growing, it is not as wide-spread as it should be, notwithstanding that those farmers who do adopt it are unanimous in their testimony of its value.

It would be more general if all dairy farmers were quite clear why in the animal economy a fall in temperature means a diminution in the flow of milk. An elementary outline of the factors causing this will enable them to better understand the reason.

All animals may be regarded as machines carefully constructed for doing work, not unlike a locomotive steam engine, which is warm, and moves along because the heat from the burning coal turns the water in the boiler into steam, which in turn moves the piston that sets the whole mechanism in motion. We know that if an engine is to do certain work, or travel so many miles, it has to be stoked continuously with coal or other fuel, but when the fuel gives out the engine becomes cool, and comes to a stand-still. The body of a cow is like that engine, only more highly organized and complex, and fed with food instead of coal. She is warm, and moves about because a fire is continually burning in her body, and that fire, like the furnace of the locomotive, must be replenished from time to time. It is therefore food being burned, or oxidized, within the animal organism which enables her to keep warm, move about, and carry on the production of milk.

These results are accomplished through the digestive process. For all practical purposes the nutritive elements of food can be divided into two classes—(a) nitrogenous, which include the proteids and albuminoids; (b) non-nitrogenous, which include the carbohydrates and fats. The nitrogenous are called flesh-formers, and the non-nitrogenous energy or heat producers.

The essential function of the flesh-formers is to build up and maintain the tissues, muscles, skin, and various organs, although, if there be an excess of such constituents in the food, it may be stored up in the body in the shape of fat, and may be used in the production of heat and energy, should the necessity arise. The heat and energy producing elements which, as previously mentioned, include the carbohydrates (starches and sugars) and natural fats, produce, through their oxidization in the system, the necessary heat for maintaining the body temperature and provide energy. They also may be stored up in reserves, as fat, or "condition," and can be drawn on at need for warmth or heating purposes. The regulation of this heat generated in the body by the burning food is automatically controlled by the sensitive nerves throughout the skin, which control the sweat glands and pores. It will be noticed in a healthy animal that the normal temperature (101.7) varies only to an infinitesimal degree on the hottest or coldest day. It is obvious, therefore, that if the body heat is dependent upon the food consumed, and that the amount of food required is governed largely by the amount of heat or energy used by the system, anything that will mitigate the loss of heat, or prevent the appropriation of the stored-up fat for heating purposes, must reduce

the fodder bill. If the cows are left unprotected from the cold during the bleak winter weather food, which would otherwise go to produce milk, or store up surplus condition, is burned for fuel, for it must always be remembered that it is only after the immediate needs of the body is satisfied that any surplus can be utilized for storing up surplus flesh or the production of milk. There are many expedients at the disposal of the dairy farmer to prevent the loss of heat and condition, and consequent reduction in the milk yield.

Housing, which is so universal in European countries, is not favoured in our congenial latitude. The size of the herds, and labour involved, also prevent it. The planting of trees and wind-breaks in well-selected places would be a great protection from the cold biting winds, so much felt by dairy herds in exposed paddocks.

Rugging, however, seems the most popular form of protection. If done intelligently it will be found very efficacious. The initial outlay is small, and will probably prevent the loss of much money, and, perhaps, the death of cows from exposure. A couple of sound sacks sewn together make a very good rug, and soon becomes waterproof through the natural exudate from the skin.

The practice sometimes followed of never removing the rug, even during the warmer hours of the day, must be condemned, for the animal, under such conditions, derives very little benefit. The hair will become fine, and the natural resistance to cold exercised by the skin nerves become vitiated, and fail to prevent the leakage of animal heat. The cow's skin also becomes itchy, and irritation sets up. The irritated animal will be found continually rubbing herself, and the rug soon becomes dilapidated.

The rugs should, therefore, be removed in the day-time when the shade temperature reaches 60 degrees. The cow can then keep herself clean by licking, the hair will be given an opportunity of thickening out, and for a few hours, at any rate, the rug can be hung on a fence to dry and air.



In the effort to give more relief to cattle raisers throughout the Territory the Hawaiian Board of Agriculture and Forestry is now considering the proposition of introducing from Australia a bird which will destroy the adult fly.

The bird which has been highly recommended is a fly catcher called the Shepherd's Companion (*Rhipidura tricolor*). It is also known in Australia as Willie Wagtail, because it spreads its tail out fan-like and wags it from side to side. The bird has a wide range of distribution from Australia through the Malay Islands to the mainland of Asia.

The Willie Wagtail is considered to be wholly insectivorous and for this reason there is no danger of its becoming a menace to rice or other agricultural crops in these islands. In its native habitat it is very seldom found in the thick forest country or in the middle of cane fields, but is often found around the edges by the roadside especially if horses and cattle are about. There is little doubt that it would be of benefit in these islands for it feeds on flies of various sorts, grasshoppers and nearly any insect that is moving about. For this reason, it would also take beneficial insects as well as harmful ones, but the few beneficial flies that it would capture would be offset by the leafhoppers, moths and other cane enemies which it would consume, thereby squaring accounts.

METEOROLOGICAL OBSERVATIONS.

STATE RESEARCH FARM, WERRIBEE.

Summary of observations made during 1921, and comparison with averages for previous years:—

RAINFALL.

Average annual rainfall for forty-two years prior to 1913	..	=	20·19 inches.
Average annual rainfall for period 1913 to 1920 (8 years)	..	=	19·55 "
Rainfall during 1921 (3 inches in January)	..	=	20·45 "

BRIGHT SUNLIGHT.

Average annual total during 7-year period 1914 to 1920	=	1,851·8 hours	=	Daily Mean, 5·0 hours.
Total during 1921	..	= 2,217·6	„	= Daily Mean, 6·0 „

EVAPORATION.

Average annual total from free water surface during 7-year period 1914 to 1920	=	46·641 inches.
Total during 1921	=	44·802 ..

MEAN AIR TEMPERATURES.

Period.	Dry Bulb.	Wet Bulb.	Maximum.	Minimum.	Mean of Max. and Min.
Average for 7 years, 1914 to 1920	58·1° F.	53·9° F.	67·2° F.	48·3° F.	57·7° F.
During 1921	59·5° F.	54·8° F.	68·3° F.	48·8° F.	58·5° F.

MEAN SOIL TEMPERATURES.

Period.	At 1 Inch.		At 6 Inches.		At 12 Inches.		At 24 Inches.	
	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.
Av'ge for 7 years, 1914 to 1920	69·5° F.	51·7° F.	62·0° F.	54·1° F.	60·0° F.	55·6° F.	59·1° F.	56·9° F.
During 1921	64·6° F.	52·2° F.	63·9° F.	56·2° F.	61·5° F.	57·2° F.	60·4° F.	58·1° F.

MEAN OF MAXIMUM AND MINIMUM SOIL TEMPERATURES.

Period.	At 1 Inch.	At 6 Inches.	At 12 Inches.	At 24 Inches.
Average for 7 years, 1914 to 1920	60·7° F.	58·0° F.	57·8° F.	58·0° F.
During 1921	58·4° F.	60·0° F.	59·3° F.	59·2° F.

EARLY MATURING PIGS,

How Quickly Large Whites put on Flesh.

An impression, a correspondent writes, has been created, and perhaps still exists, that Large White Pigs mature slowly. This doubt has been completely dispelled by many practical tests carried out by breeders, feeders and experimentalists. In this connexion it is instructive to learn the evidence of Mr. George R. Remmell in a bulletin issued some time ago by the United States Department of Agriculture, Bureau of Animal Industry. He states:—

“These experiments, taken in connexion with the evidence of investigators over the entire country, undoubtedly show that representative pigs of the different breeds do not materially differ either in the rate of gain or the economy with which the gains are made. Any marked difference in the breeds will be manifested in the suitability of the fattened animals for market, and the quality of the carcass on the block. A very notable feature is the showing of bacon breeds when compared with the lard breeds. The fact that a pig is a Large White or a Tamworth cannot be taken as *prima facie* evidence that it will make slow and expensive gains.”

In view of these remarks it is interesting to learn that three Large White Boars (barrow pigs) from the herd of Mr. A. W. Coultrip, Norwood Manor, Eastchurch, Sheerness—an enthusiastic supporter of this breed in Kent—which were recently killed at 15 weeks old, attained the following weights:—108 lbs., 103 lbs., and 86 lbs.

The pigs were weaned at eight weeks old and thereafter fed three times a day on damaged Quaker oats, barley meal, and a little fish meal, the meal being fed warm. This surely proves the value of Large Whites for early maturity.—*The Farming News, Scotland.*

THE SOWING OF WATTLE SEEDS.

Green, silver, and black wattles are almost invariably sown *in situ*, i.e., directly on the ground where they are to stand permanently.

The best time for sowing varies with different localities. In places where frosts are severe, sowings made in February to April seem to answer best. The young wattles, by the time the cold weather arrives, are well rooted but still lie flat on the ground. In this position they stand cold much better than when they have thrown up an erect shoot, and consequently they are in a condition to start vigorous growth first thing in spring. By the following winter, in localities suited for their culture, they should be well enough established to endure its rigours

unharmed. At lower elevations where frosts need not be feared, sowing should be done with the first heavy rains in summer.

The seed may be either sown in lines or broadcasted. The former method is preferable except on clean, newly broken up land, as cleaning and cultivation of the crop are greatly facilitated. A good espacement between the lines is 6 feet. For broadcast sowing about 16 lbs. of seed is needed per acre, according to the size of the seed, while in line sowing 2 to 3 lbs. is enough.

Before sowing, wattle seed should be specially treated to soften hard seed coat, otherwise the seeds may lie in the ground without sprouting for a very long time, and thus an uneven germination will result. The treatment consists in pouring boiling water on the seeds and letting them remain in it for twelve to twenty-four hours, or even longer, but, at any rate, long enough to soften the seeds sufficiently to allow of them being cut with the finger nail.

Once the seeds have reached this condition they should be sown without delay. It will be found that after the soaking process they clot together, and that there is then difficulty in sowing them evenly. This difficulty may be overcome by washing them in clean water to remove the mucilage, or by mixing them with enough fine dry sand to absorb it. Land intended for the cultivation of wattles should be broken up the summer or autumn previous to sowing, and should be worked up in the same manner as if a crop of maize or oats were to be grown on it.

For a couple of seasons, till the wattles are thoroughly established, they should be kept clear of grass and weeds.—Reprinted, with slight alterations, from *Journal of the Department of Agriculture, Union of South Africa*.

SOUTH AFRICAN AND AUSTRALIAN WINES.

An interesting section of the Annual Brewers' Exhibition held in London, is the Colonial Wine Competition, where South African and Australia wines are exhibited and judged. The 1919 competition resulted in Australia annexing all the first prizes, while South African wines secured only one second and four third prizes. The following year's competition saw a reversal in favour of South African wines, which obtained in the fourteen classes as many as eleven first, five second, and two third prizes, being beaten by Australia in two classes only. The result of the 1921 competition has just come to hand and shows a more even distribution of prizes. There were again fourteen classes of wines. South Africa secured five firsts, eight seconds, and six thirds, against Australia's nine firsts, four seconds, and three thirds. The latter country's produce was successful, therefore, in obtaining

more of the first prizes awarded than South Africa, but in the aggregate number of awards South Africa was first.

The competition produced some interesting specimens, and the judges in making their awards found wines that should compete favorably with Continental growths. They give the opinion that the competition is of practical benefit to the trade and proves that South Africa and Australia are capable of producing wines that can compare very favorably in quality and style with those of other countries. But the most important consideration is the cost of production, which must be at a price that will create a ready demand. The judges give it as their opinion also, on the wines as exhibited, that those most likely to be popular in Great Britain would be of the full Claret or Burgundy type.

ORCHARD AND GARDEN NOTES.

E. E. Pescott, F.L.S., Pomologist.

The Orchard.

As soon as the fruit is off the trees, the land should be well ploughed and left in a rough condition until the spring ploughing. If not already done, and the orchard conditions demand it, there is still time to put in a leguminous crop for green manuring purposes. But this should be done as early as possible, so as to give the crop a chance to make some good early growth. Soils deficient in lime or in organic matter are always benefited by a crop of green manures. Where stable manure is unprocurable, the green manure crop is the only means of adding organic matter to the soil.

PESTS AND DISEASES.

All second-hand and old cases should be thoroughly overhauled. It is preferable to do this work now, instead of leaving it till spring, when the rush of other duties will certainly prevent it being carried out. The cases, if not bad enough to be destroyed by fire, should be dipped for some time in boiling water. And this is not only for the killing of the codlin larvæ, but also to destroy larvæ or eggs of any scale or aphis, and also any spores of fungus diseases that may have found lodgment therein.

As soon as the trees have shed their foliage they may be sprayed with red oil emulsion for woolly aphis, peach aphis, and the bryobia mite. And this should be done before pruning, so that in handling and carrying the prunings the pests will not be spread about the orchard to infect the clean portions.

The Flower Garden.

Bulbs, tubers, and corms of spring-flowering plants should now all be planted. As they appear above ground, they should be protected from the ravages of snails and slugs, as these pests have a very great

liking for these succulent growths. A good surface dressing of broken leaf or dust tobacco will effectually deal with these pests. In fact, the gardener who constantly uses tobacco, either in the leaf, stem, or dust forms, will very soon be in the happy position that slugs and snails will cause him no anxiety whatever. Besides, the tobacco has manurial properties which are also valuable.

Pansy and any other seedlings, also rooted layers and cuttings, may now be planted out into their permanent positions.

Sowings may also be made of any hardy annuals, such as antirrhinum, aquilegia, correopsis, Canterbury bell, dianthus, everlastings, foxglove, gaillardia, hollyhock, larkspur, leptosyne, lobelia, marigold, pansy, petunia, stock, sweet peas, verbena, wallflower, &c.

The Vegetable Garden.

There should now be no untidy or undug beds in the kitchen garden. The vacant beds should all be well dug over and prepared for the planting of vegetables for use in spring. In digging, a top dressing of manure should be given; this may be dug in. All weeds, too, may be forked into the trenches, and covered well with soil as each spit or length is dug. A dressing of lime is very beneficial at this time of the year three or four weeks after the manure or weed dressing.

A start should now be made at cleaning out the asparagus beds. This vegetable is most popular, and yet one rarely met with in ordinary household gardens. It is supposed to be difficult to grow, but this supposition is not borne out, as, once established, a bed of asparagus is one of the most easily managed plots in the whole garden. Depth of good soil and plenty of manure are all that this plant requires.

In establishing a new bed, it is advisable to see that there is a good depth of 2 or 3 feet of rich, well-manured soil. If this is not present, the soil should be dug out to that depth, and thoroughly mixed and enriched with well-rotted manure before being replaced. A bed deeply prepared, and supplied with ample quantities of manure, should last without replanting for very many years. The young plants or crowns should then be planted in trenches, keeping the rows 2 or 3 feet apart. An asparagus bed requires ample and direct exposure to the full rays of the sun. The asparagus should not be cut during the first season after planting; in fact, it is better to allow it to go uncut for two seasons. As little foreign weed growth as possible should be allowed in the beds, but, when they are not producing culinary asparagus, rows of lettuce, beans, radish, &c., may be grown between the crowns.

Towards the end of April the tops may be cut down, the beds cleaned, and a good top dressing of stable manure given. Chemical fertilizers, such as bonedust, sulphate of ammonia, and sulphate of potash, may be given as a substitute to organic manure. In the past it has been the custom to annually top-dress the beds with salt. It was supposed that, as asparagus in its native habitat was usually found in sandy soils near the sea coast, the plant required salt or a saline soil to produce successful results. It has latterly been found that salt is not at all essential to

good growth, and that the plant will readily adapt itself and grow well in soils of not at all a saline character. Where potash has taken the place of salt, quite improved results followed.

Seeds of onion, turnip, cabbage, cauliflower, carrot, and parsnip may now be sown.

REMINDERS FOR MAY.

LIVE STOCK.

HORSES.—Those stabled can be fed liberally. Those doing fast or heavy work should be clipped; if not wholly, then trace high. Those not rugged on coming into the stable at night should be wiped down and in half-an-hour's time rugged or covered with bags until the coat is dry. Old horses and weaned foals should be given crushed oats. Grass-fed working horses should be given hay or straw; if there is no old grass, to counteract the purging effects of the young growth. Attend to teeth and feet of horses to be turned out for the winter.

CATTLE.—Cows, if not housed, should be rugged. Rugs should be removed in the daytime when the shade temperature reaches 60 degrees. Give a ration of hay or straw, whole or chaffed, to counteract the purging effects of young grass. Cows about to calve, if over fat, should be put into a paddock in which the feed is not too abundant. Calves should be kept in warm dry shed. Observe strict cleanliness in feeding to avoid losses and sickness incidental to calf-rearing.

PIGS.—Sows not already served should be put to the boar. Supply all pigs with plenty of bedding, and see that sties are warm and well ventilated. Supply sows liberally with grain. Castrate young boars as early as possible. Pigs should be highly profitable now, as pork is very dear. Rape, barley (especially skinless), oats, &c., may be sown for grazing during winter. Crushed oats will be the most economical feed for pigs at present prices.

SHEEP.—Keep in-lamb ewes in strong condition. Best lambing results are obtained when ewes are neither too poor, nor excessively fat. Once the lambs arrive then the most liberal treatment possible is in the main the most profitable. Ill-fed ewes are bad mothers, indifferent to the new-born lamb, and rearing them badly afterwards, particularly very young or very old ewes. Select fine weather for lamb-marking. Yard lambs over night. Never castrate or tail high-conditioned lambs immediately on being run in and overheated. The risk with large lambs will be lessened if they are allowed to stay in the yards an hour or two after castration and the coagulated blood drawn, which in many cases will be found retained in the groin and purse, no matter what method of opening the purse is used. In tailing never draw tails tight. Projecting bone delays healing, especially when cutting off with hot blades. Even with the knife leave enough loose skin to come over and cover the vein and check the usual strong rush of blood from lambs on well-fed mothers.

POULTRY.—Feed animal food to forward pullets, about $\frac{1}{2}$ oz. daily, and equal parts heavy oats and broken maize at night. Add lucerne chaff to mash daily. See that fowl houses are free from draughts to avoid colds, also that they are free from red mites. Use Epsom salts freely to avoid Roup and Chicken Pox.

CULTIVATION.

FARM.—Dig main crop potatoes. Push on with ploughing and sowing of cereal crops, including peas and beans. Green fodder (as for April) may still be sown. Land for maize, potatoes, and other root crops should be prepared and manured. Flax may be sown. Transplant Chou Moellier and Giant Drumhead cabbage plants in rows 3 feet apart. Complete sowing permanent pastures with grasses and clovers.

VINEYARD.—Subsoil land for new plantations if not already done. This work should be carried out as long before planting as practicable. Vine-growers are warned against the too common practice of feeding off foliage after vintage. Any small advantage in the form of stock feed is only gained at the cost of a reduction in the following season's crop, owing to interference with accumulation of reserves, which continues so long as the leaves remain green. Sheep should not be allowed into the vineyard until all leaves have changed colour. Early and deep ploughing is strongly recommended. Manures should be applied as early as possible. Peas, &c., for green manuring, should be sown without delay, in order to take advantage of early rains.

Cellars.—Rack or fill up (preferably the former) dry wines as soon as a lighted match, introduced at bung hole, is no longer extinguished. Sweet wines should also be racked and fortified to full strength.

ORCHARD.—Plough, manure; apply lime to orchard lands at rate of 5 or 10 cwt. per acre where soil is sour. Spray trees infested with scale insects, Woolly Aphis, and Bryobia Mite with red oil or crude petroleum. Clean all rough bark from trees. Commence pruning early varieties at end of month.

FLOWER GARDEN.—Digging, manuring, and pruning; trench and drain where necessary. Dress the surface with lime. Continue to sow hardy annuals. Bury all leaves, soft-wood cuttings, and weeds. Continue to plant spring blooming perennials and other plants. Plant cuttings of carnations and roses.

VEGETABLE GARDEN.—Cut down and clean out asparagus beds. Apply manure and lime dressings. Cultivate deeply. Plant out seedlings and early potatoes; sow peas, broad beans, carrots, and parsnips.

BEE-KEEPING.

REMINDERS FOR MAY.

May is the last month during which bees may be examined, handled, and, if necessary, fed without risk of endangering the existence of the colonies or seriously interfering with their safe wintering. 'Supers' (upper stories) should be removed and stored indoors in a dry place, care being taken that bee moths cannot get access to the combs. Where suitable storage room is not available indoors, the boxes of spare combs may be left outside, but should be placed underneath the box containing the cluster of bees and the entrance to the hive contracted to one-third or fourth of the summer width.

Small colonies should be reduced to one set of combs on a single story, and any combs not covered by bees are best removed if the amount of stores is insufficient and has to be supplemented by feeding sugar syrup. The amount of honey or sugar syrup necessary to carry bees safely through the winter varies according to the strength of the colony, the locality, and the earlier or later flowering of the spring flora of the district. It is therefore not possible to state what the amount should be; it may, however, be laid down as a general rule that the combs which the bees cover at this time of the year should be at least more than half-full of sealed honey or sugar syrup. When sugar syrup has to be fed to supplement the stores it should be given inside the hive, and should be of the density of ripe honey, or approximately two (by weight) to one of water. The simplest way of making syrup is to pour the measured quantity of dry sugar into the correct amount of boiling water, keeping it on the stove and stirring it till dissolved. The syrup should be given blood warm in a simplicity or frame feeder.

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Dam's Record	14713 lbs. milk	...	6 years average	11338 lbs. milk
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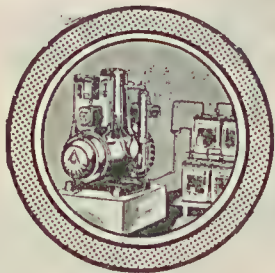
Dam's Record (1st milking) 7144 lbs. milk.						
Dam's	Dam's	..	14533 lbs. milk	...	4 years average	12871 lbs. milk
Sire's	Dam's	..	10370	..	7 ..	9354 ..
Sire's	D. Dam's	..	9510	..	12 ..	8033 ..
G. Sire's	D. Dam's	..	10215	..	7 ..	9386 ..
G.G. Sire's	D. Dam's	..	12565	..	10 ..	8853 ..
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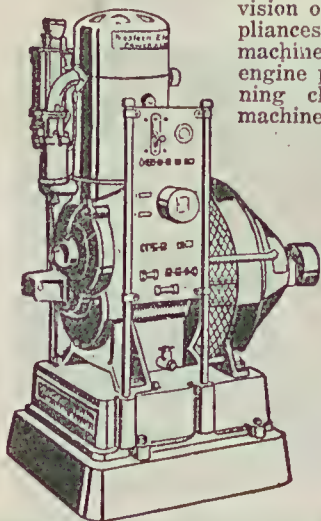
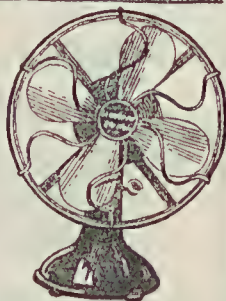


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I sent you word that I would let you know when I killed my sow. I bought her on 3rd June for £2 7s. I had her killed on 3rd March, 1920, which is nine months, and she weighed 376 lbs.

The first five months I fed her three times a day on sharps, then I mixed it with Indian meal, about one-half for a month, afterwards giving all Indian meal, and she had three Karswood Pig Powders every week. I went on Monday to see the farmer I bought her from, and he told me that he killed his a week after mine, and she was 242 lbs., and she had milk and butter-milk, and for the last two months he had fed her on barley meal and oil-cake. It was a sow as well as mine. I may say that I am over 70 years of age.

1st April, 1920.

WILLIAM CARTWRIGHT.

Pigs, 172 lbs.
after six months' treatment with
Karswood Pig Powders.

PRIMROSE HILL,
WILTON, ENG

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MRS. MUSSELWHITE.

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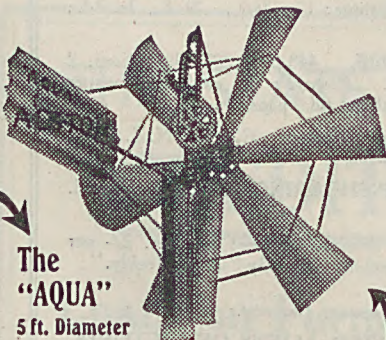
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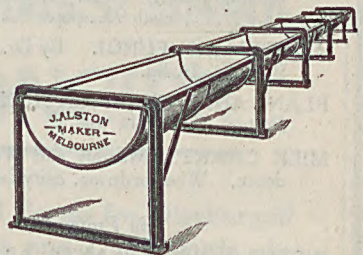
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